

Hardware Support Manual

HP 7570A DraftPro PLOTTER

SERIAL NUMBERS

This manual applies directly to plotters with serial numbers prefixed 2647A.

Product History for plotters with serial number prefixes 2631A, and 2618A is provided in Chapter 11.

For additional information about serial numbers, see **SERIAL NUMBER INFORMATION** in Chapter 1.

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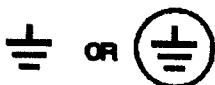
General Definitions of Safety Symbols Used On Equipment



International caution symbol (refer to manual): the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the product.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in a manner described in the installation (operating) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current



Direct current



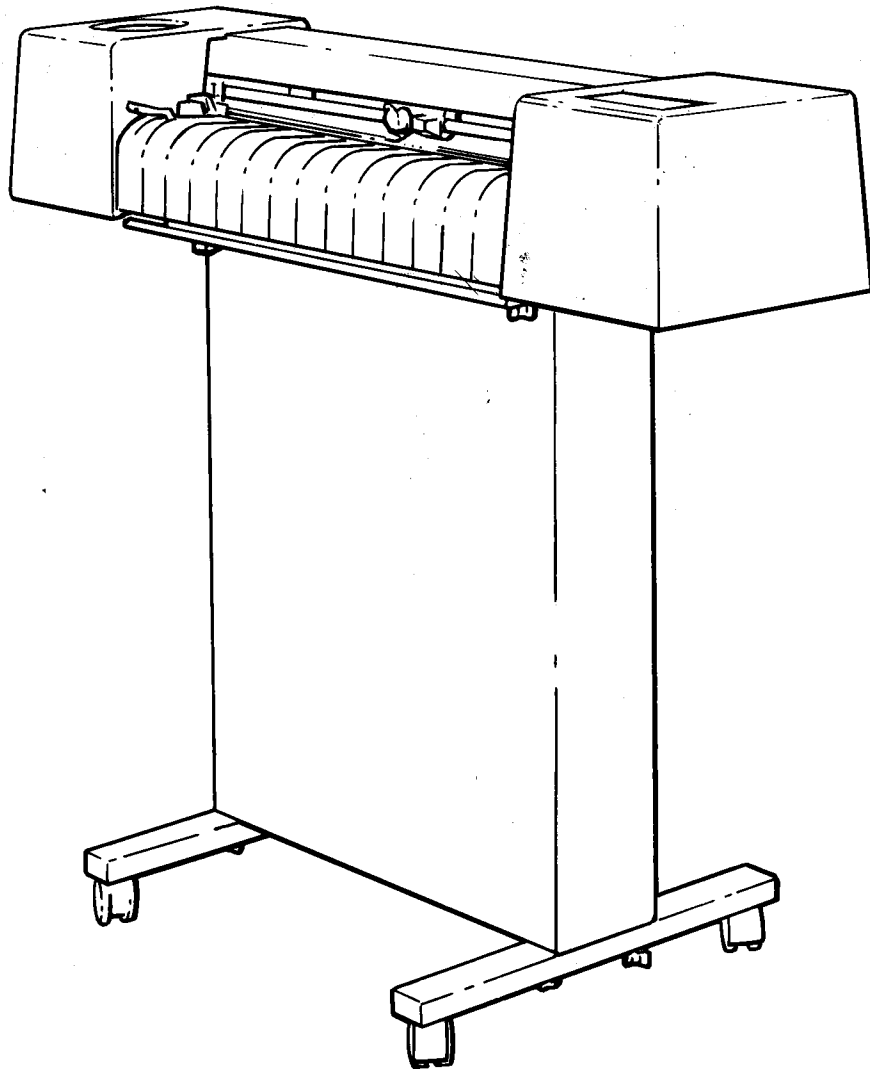
Alternating or direct current

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which if not correctly performed or adhered to, could result in damage or destruction of part or all of the product.



7570-A-1-1

Figure 1-1. Hewlett-Packard 7570A DraftPro Plotter

1-1. INTRODUCTION

1-2. This hardware support manual contains information necessary to test and service the Hewlett-Packard 7570 DraftPro Plotter. 1-3. This manual is divided into twelve sections as follows:

1. PRODUCT INFORMATION
2. SITE PREPARATION
3. INSTALLATION AND CONFIGURATION
4. PREVENTIVE MAINTENANCE
5. FUNCTIONAL DESCRIPTION
6. REMOVAL AND REPLACEMENT
7. ADJUSTMENTS
8. TROUBLESHOOTING AND DIAGNOSTICS
9. REPLACEABLE PARTS
10. REFERENCE
11. PRODUCT HISTORY
12. DIAGRAMS

1-4. This Product Information chapter includes a description of the HP 7570, its specifications, accessories supplied, accessories available and a list of test equipment and special tools required to support the plotter.

1-5. PRODUCT DESCRIPTION

1-6. The Hewlett-Packard 7570 DraftPro Plotter (See Figure 1-1.) is a dual microprocessor controlled plotter providing graphic displays of computer program output data. An expansion connection is provided for additional interface modules and for expansion ROMs.

1-7. The HP 7570 will accommodate ISO A2 (ANSI C) or A1 (ANSI D) size media, either paper, polyester film, or vellum. The plotter will also accommodate expanded versions of the media which allows the pen to access the entire nominal sheet size. The preferred media thickness is 0.0762 mm (0.003 in.) with a recommended thickness of 0.0508 to 0.1016 mm (0.002 to 0.004 in.). The media is driven by grit covered drums and held in place by pinch wheels which are raised and lowered manually. The left-hand pinch wheel is in a fixed position, while the right-hand pinch wheel is manually moved by the operator to accommodate the different media sizes. A vacuum fan system holds the media to the platen preventing the possibility of high spots on the media and resultant erroneous pen marking.

1-8. There is an eight pen rotary carousel located at the left hand end of the plotter from which pens may be selected by program control or operator selected by using front panel pushbutton switches.

Pens will be automatically stored and capped when not in use. The HP 7570 is capable of using fiber tip, or liquid ink pens. The carousels are manually interchanged.

1-9. The standard interface for the HP 7570 is the serial RS-232-C interface capable of either direct or "eavesdrop" connection with the "Y" cable. The IEEE STD-488 interface (HP-IB) may be ordered as a plug-in unit.

1-10. OPTIONS

1-11. Currently there are no options available for use with the HP 7570.

1-12. INTERFACE CARTRIDGES

1-13. Specialized interface cartridges are available for use with the HP 7570. See Figure 1-2. The descriptions and part numbers are listed in Table 1-1.

Table 1-1. Interface Cartridge

Description	HP Part Numbers
HP-IB Interface *	17570A
HP-IB Interface + Kanji	17571A

* Not available in Japan.

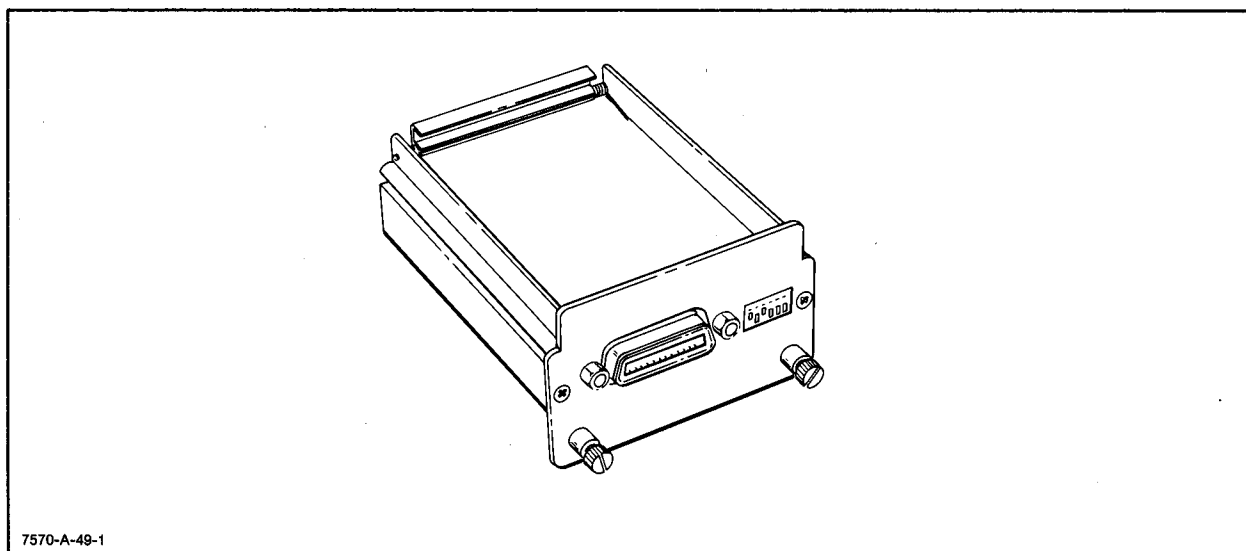


Figure 1-2. Interface Cartridge

1-14. ACCESSORIES

Table 1-2. Accessories Supplied

Description	Qty	HP Part Number
User's Guide *	1	07570-90002
Plotter Paper Arch. D 24 x 36 in.	5 sheets	
Fiber Tip Pens Pkg 0.3 mm nib width 1 ea. red, blue, green, black, yellow	1 pkg.	17845P
Pen Carousel for fiber tip pens	1	07570-60050
for drafting pens	1	07570-60055
Power Cord **	1	(as per destination)
Brush, grit wheel cleaning	1	8710-1386

* The manual will be in one of six languages, determined by destination.

** Power cord supplied is based on the destination of the plotter.

Table 1-3. Accessories Available

Description	HP Part Number
Programmer's Reference	07570-90001
Pocket Guide	07570-90003
Interface Cable * RS-232-C/CCITT V.24	HP 17355M (m to m) 3 metres
HP-IB	HP 10833A/B/C 1/2/4 metres

* Other interface cables are listed in the Computer Users Catalog.

1-16. PERFORMANCE SPECIFICATIONS

1-17. Table 1-4 lists the specifications for the HP 7570. These specifications include the performance standards against which the plotter is tested. Table 1-5 lists the plotter's supplemental characteristics. Supplemental characteristics are not specifications, they are typical characteristics and are provided as additional information for the user.

Table 1-4. Performance Specifications

Repeatability

With the same pen: ± 100 micrometres (0.004 in.)

Pen to Pen: ± 200 micrometres (0.008 in.)

Accuracy: (Ability to position a pen relative to an absolute scale.)

± 0.5 mm (0.02 in.) or $\pm 0.2\%$ of the move, whichever is greater. *

* With 0.075 mm (0.003 in.) double-matte polyester film from 10 °C to 30 °C.

Table 1-5. Supplemental Characteristics

Maximum plotting area:

C 457 mm x 610 mm *

D 610 mm x 914 mm *

* subtract margins of 5 mm (0.2 in.) on three sides and 31 mm (1.2 in.) on the fourth.

Pen velocity

Pen down: programmable: 1 to 40 cm/s (0.4 to 15.7 in./s)

Pen up: 51 cm/s (20 in./s) (regardless of pen down speed)

Addressable step size: 25 micrometres (0.001 in.)

Mechanical resolution: 13 micrometres (0.0005 in.)

Acceleration: 2000 cm/s² (2g)

Buffer size: 7448 bytes (Shared between user definable, polygon, and pen sort buffers.)

Power requirements

Source: 100, 120, 220, or 240 Vac $\pm 10\%$

Frequency: 50 to 60 Hz

Consumption: 80 W maximum

Size

Height: 1030 mm (40.6 in.)

Width: 1140 mm (44.9 in.)

Depth: 520 mm (20.5 in.)

Weight

Net: 30 kg (66 lb)

Shipping: 52.2 kg (115 lb)

1-18. SERIAL NUMBER INFORMATION

1-19. The plotter serial number is located on the rear panel. Hewlett-Packard uses a two-part serial number consisting of a four-digit prefix and a five-digit suffix separated by a letter (0000A00000). The prefix is the same for all identical plotters and changes only when a modification is made that affects parts compatibility. The suffix is assigned sequentially and is different for each plotter. This manual applies directly to plotters with the serial prefix number(s) shown on the title page.

1-20. If the serial number prefix of your plotter is higher than the one shown, one or more update packages of revised pages are supplied with the manual. Use these new pages to replace the original pages in the manual. If two or more update packages are supplied, insert them in order by revision letter; that is, Revision A first, then Revision B, etc. The title page will then show the latest serial prefix and the manual will apply directly to plotters with that prefix.

1-21. If the plotter at hand has a lower serial prefix than the one shown on the title page, information in the Product History section will adapt this manual to that plotter.

1-22. RECOMMENDED TOOLS AND TEST EQUIPMENT

1-23. The tools required to maintain the HP 7570 are listed in Table 1-6. The HP Tool Kit, Part Number JTK-536 is recommended. Test equipment recommended to maintain the HP 7570 is listed in Table 1-7.

Table 1-6. Tools Required

Pliers, needle nose
Screwdriver, Pozidriv #2
Screwdriver, Pozidriv #1
Screwdriver, common flatblade
Torx driver T 20W
Nut driver, 5/16 in.
Spring Tool, combination

Table 1-7. Recommended Test Equipment

Type	Recommended Model
Computer/Controller	HP-85 Personal Computer with appropriate interface HP 82937A HP-IB Parallel Interface HP 82939A RS-232-C Interface HP 17355M RS-232-C Interface Cable
ROM Drawer	HP 82936A
I/O ROM	HP 00085-15003
Digital Multimeter	HP 3465A
Oscilloscope	HP 1741A 100 MHz or greater
Optical Comparator	B&L 81-34-35
I/O Loopback Connector	HP 07440-60302
Metric Scale 0-1000 mm	
HP-85 Plotter Service Tape	HP 5010-2585

1-24. SUPPORT STRATEGY

1-25. Basic support strategy for the HP 7570 is on-site repair with assembly level replacement.

2-1. INTRODUCTION

2-2. This section contains information concerning the physical and electrical requirements for the proper installation of the HP 7570.

2-3. ELECTRICAL SPECIFICATIONS

2-4. Power Requirements

2-5. The HP 7570 requires a power source of:

100, 120, 220, or 240 Vac $\pm 10\%$; 50 to 60 Hz; 80 W max.

2-6. Line Cord Set

2-7. The ac line cord set required for use with the HP 7570 is determined by the destination of the plotter. Refer to Chapter 3 for the available ac line cord sets.

2-8. ENVIRONMENTAL SPECIFICATIONS

2-9. The HP 7570 complies with HP requirements for Class B products. The environmental limits are as follows:

OPERATING

Temperature:	0 to 55 °C
Humidity:	5% to 95% RH at 40 °C
Altitude:	to 4575 m (15 000 ft) at 47 °C

STORAGE

Temperature:	-40 to +75 °C
Humidity:	to 90% RH at 65 °C
Altitude:	to 15 250 m (50 000 ft) at 0 °C

2-10. PHYSICAL SPECIFICATIONS

2-11. The physical dimensions of the HP 7570 are illustrated in Figure 2-1.

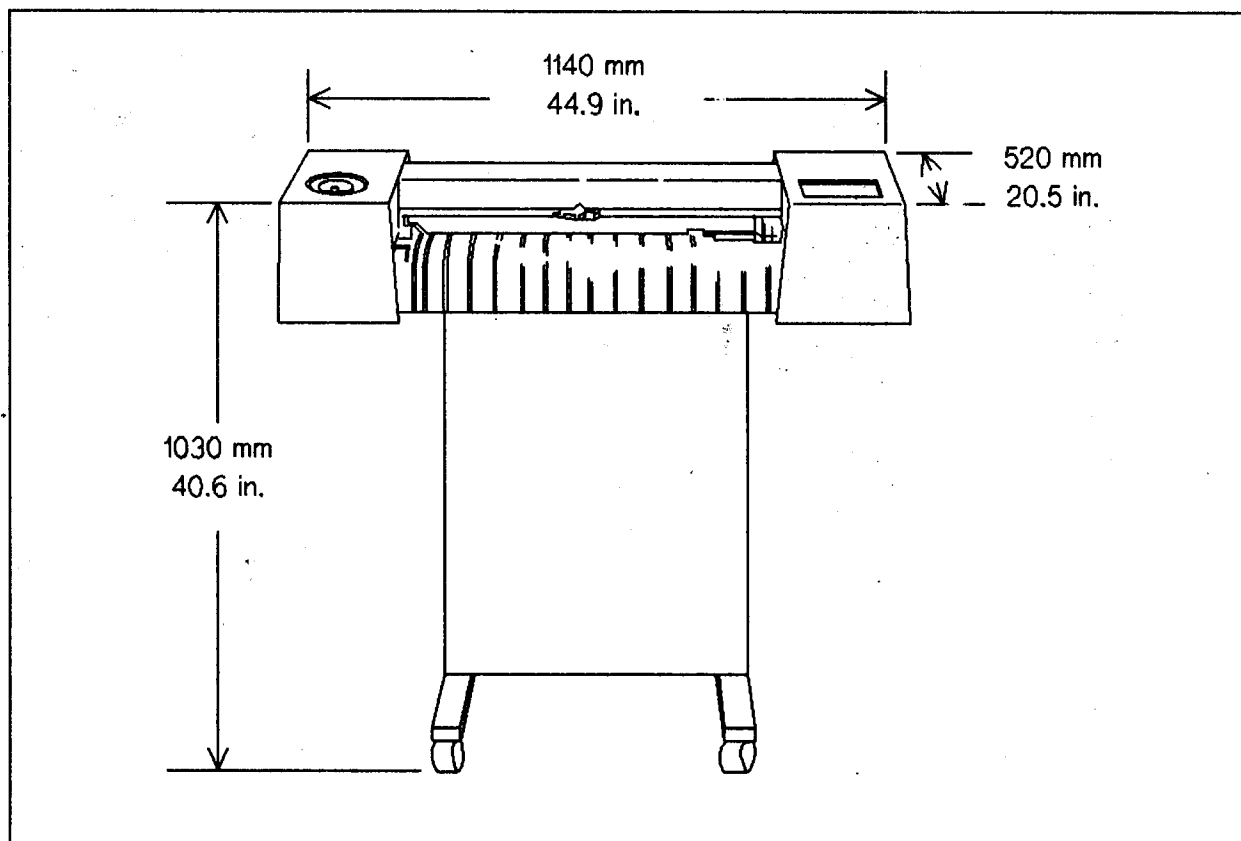


Figure 2-1. Physical Dimensions

2-12. CABLE RESTRICTIONS

2-13. Cable restrictions for the plotter are determined by the type of interface installed. Recommended maximum lengths are as follows:

RS-232-C 15.24 m (50 ft)

HP-IB 20 m (65.8 ft) or 2 m (6.6 ft) per device
whichever is less

3-1. INTRODUCTION

3-2. This chapter contains information on unpacking the HP 7570 and preparing it for use. Safety information necessary to prevent injury to personnel and to prevent damage to the equipment is also included. Be certain that you have read and understand all safety information before performing any of the procedures.

3-3. INSPECTION AND UNPACKING

3-4. Inspection

3-5. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the plotter has been checked mechanically and electrically. The contents of the shipment should be as listed in Table 1-2. Procedures for checking the electrical performance of the plotter are given later in this chapter. If the contents are incomplete, if there is physical damage, or the plotter does not pass the self test, notify the nearest Hewlett-Packard office. If the shipping container has been damaged, or the cushioning material shows signs of damage, notify the carrier as well as Hewlett-Packard. Keep the shipping material for the carriers inspection.

3-6. Unpacking

WARNING

Do not attempt to set up the HP 7570 plotter alone. This procedure requires two persons. Attempting the procedure alone can lead to serious personal injury or possible damage to the plotter.

NOTE

The plotter will not operate properly unless it is mounted on the stand.

3-7. Use the following procedure to unpack and set up the HP 7570: (Steps are illustrated in Figure 3-1.)

- a. Grasp the loose end of the strapping material and pull to remove the banding.
- b. Remove the outer carton.
- c. Remove the packing material and the package of cables and documentation.
- d. Remove the base, media sampler, legs, pens and hardware.
- e. Place the two legs on the base and secure them with lock washers and wing nuts.
- f. Remove the foam packing material.
- g. Remove the two pen carousels and set them aside. Open the plastic covering around the plotter.
- h. Invert the stand and place it over the lugs on the bottom of the plotter.

CAUTION

Be certain that the hex nuts on the plotter lugs are centered in the holes in the stand when mounting the plotter. Failure to properly center the nuts over the holes will defeat the vibration isolation, necessary for proper operation of the plotter.

- i. Secure the stand to the plotter with a flat washer and lock washer wing nut on each lug.
- j. Carefully tip the plotter and stand upright, placing the unit on its wheels.

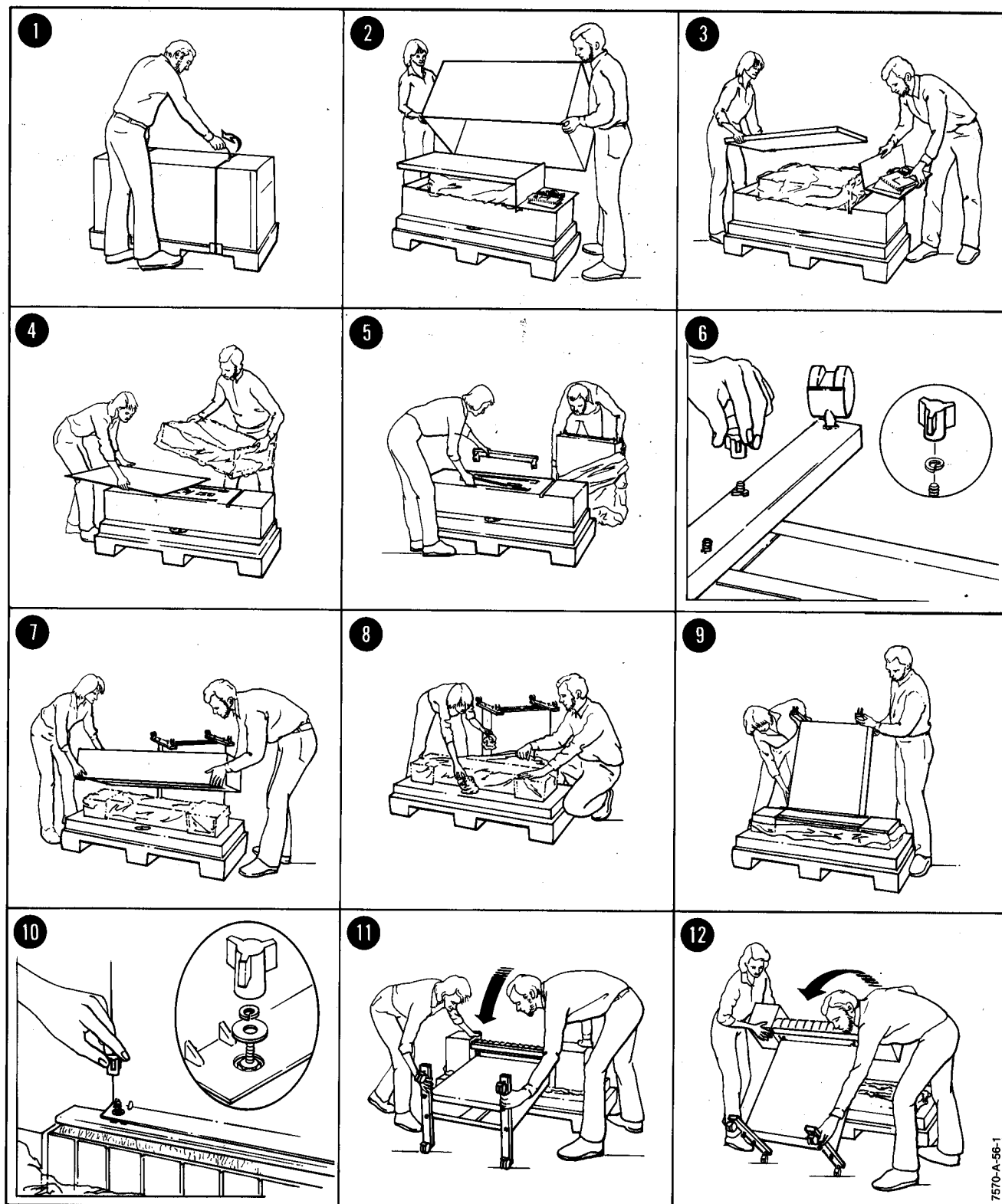


Figure 3-1. Unpacking the HP 7570

3-8. STORAGE

3-9. If the drafting plotter is to be stored for an extended period of time, the following general procedures should be performed:

- a. Remove the power cable and interface cable from the plotter.
- b. Remove all pens from the carousel and using a mild soap solution clean any ink residue
- c. Clean any ink residue or stains from the plotter.
- d. Cover the plotter to protect it from dust.

3-10. INSTALLATION AND MOUNTING

3-11. Line Voltage and Fusing

CAUTION



To prevent damage to the plotter, make sure the line voltage and fuse selection is correct before connecting line power.

WARNING

The line power cord and power outlet must have a protective earth (ground) terminal. Serious shock hazard leading to injury or death may result if the plotter is not properly grounded.

3-12. The HP 7570 primary power circuit can be configured to operate from any one of the following power sources at a line frequency of 47.5 to 66 Hz, single phase. Maximum power consumption is:

100 Vac +/-10%, 0.85 A
120 Vac +/-10%, 0.7 A
220 Vac +/-10%, 0.4 A
240 Vac +/-10%, 0.35 A

3-13. The primary circuit of the HP7570 is illustrated in Figure 3-2.

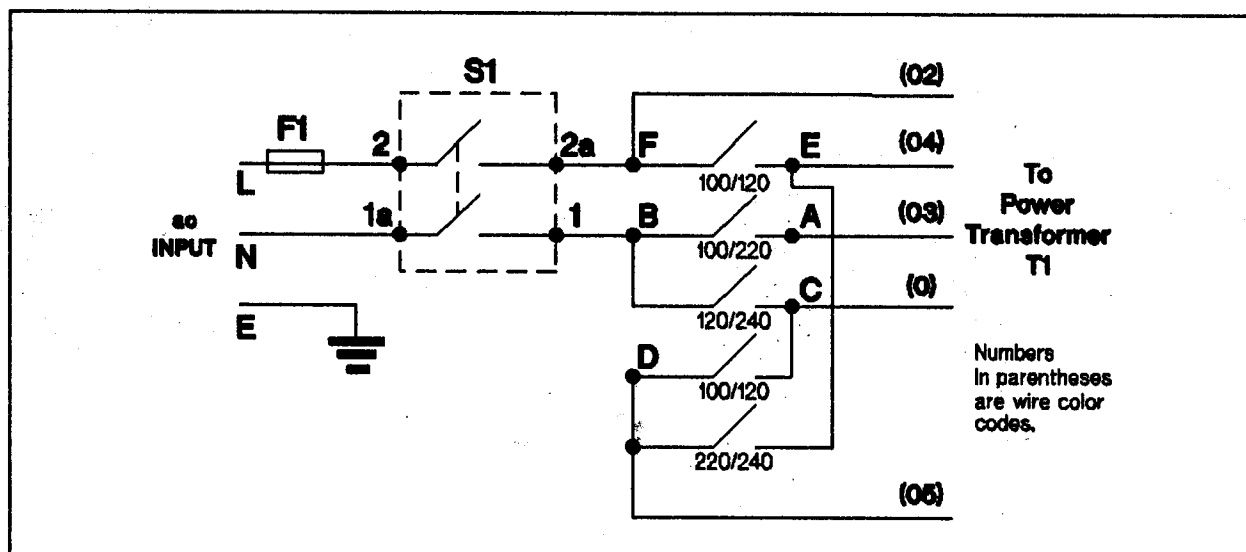


Figure 3-2. Line Voltage Indicator

3-14. The selected line voltage rating is visible through the small opening in the ac power receptacle cover.

CAUTION

Applying a line voltage of 220V or 240V to the plotter while the line voltage selection is set for 100V or 120V operation will blow the line fuse and may damage the plotter circuits.

3-15. LINE VOLTAGE SELECTION.

The line voltage selection may be changed to conform to the line voltage available in a particular area. Use the following procedure.

CAUTION

Damage to the plotter may result if the power receptacle cover is opened with the power cord in place.

- a. Set the plotter LINE switch to OFF (0) and disconnect the line cord from the plotter.
- b. Line voltage selection is determined by the plastic insert in the ac power receptacle.
- c. Use a small screwdriver to pry open the lid of the power receptacle housing. See Figure 3-3 Detail a.
- d. Remove the ac line fuse holder and fuse from the housing. Note the orientation of the fuse holder before removal. Figure 3-3 Detail b.
- e. Remove the voltage selector block from the housing. Figure 3-3 Detail c.
- f. Note the orientation of the alignment pins on the ends of the block. One end is circular and the other end is a slightly larger hexagonal pin. Figure 3-3 Detail d.
- g. Rotate the block until the desired voltage range is directly at the front of the selector block.
- h. Insert the block into the ac power receptacle, assuring that the block does not become turned during insertion. Figure 3-3 Detail e.
- i. Remove the ac line fuse from the fuse holder clip.
- j. Install a fuse with the the correct amperage and voltage rating for the selected operating voltage. Figure 3-3 Detail f.
- k. Insert the fuse holder and fuse into the upper opening of the ac power receptacle with the arrow pointed up. Do not force the holder. If properly aligned the holder will go in easily.
- l. Partially close the receptacle cover. Check that the desired voltage rating is visible through the small opening in the cover. Figure 3-3 Detail g.
- m. If correct, snap the cover tightly closed.
- n. Install the correct ac line cord set for the selected voltage range. See Figure 3-4 for illustrations of the approved line cord sets.

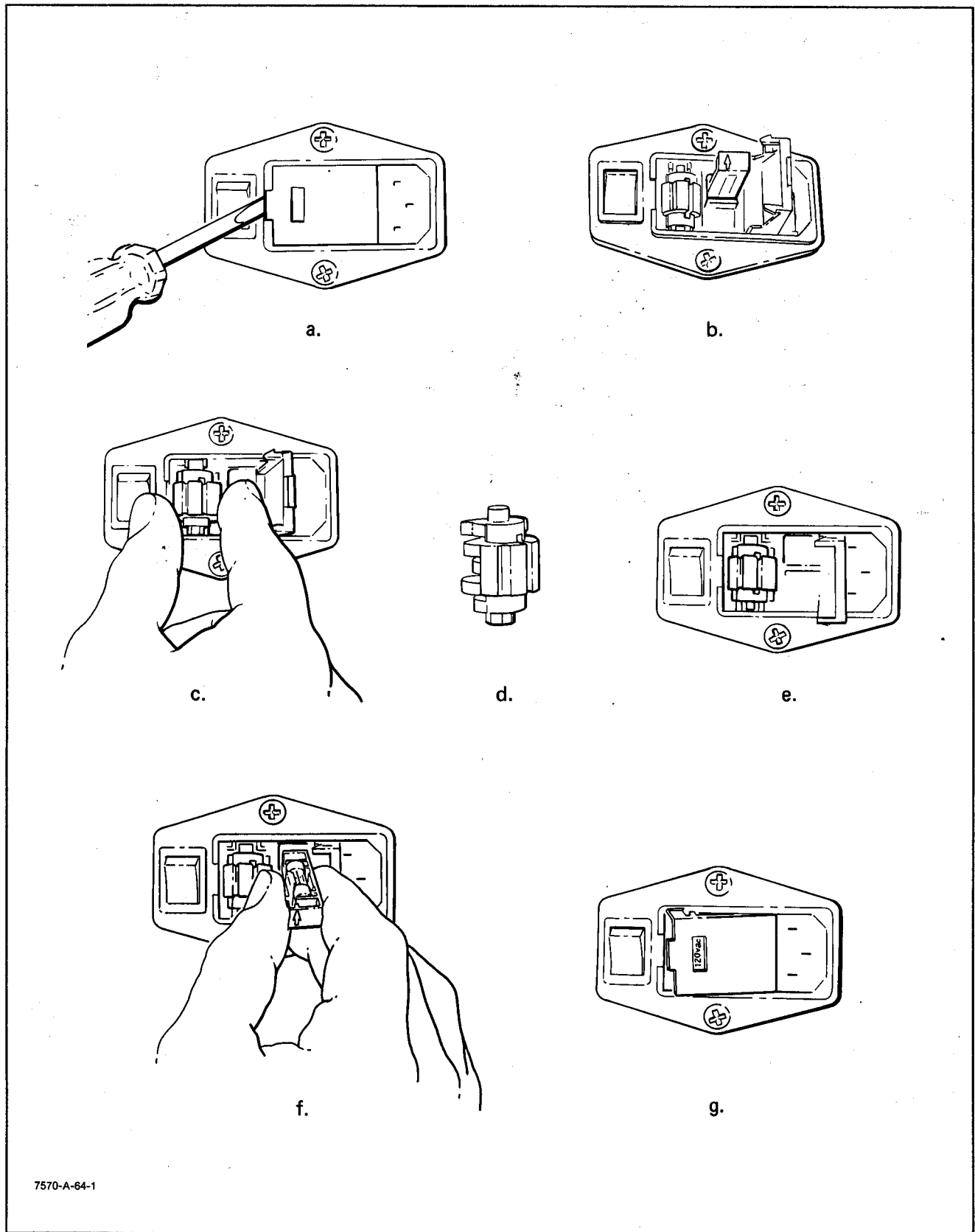


Figure 3-3. Line Voltage Selection

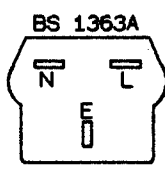

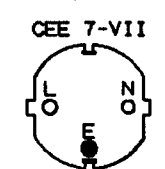
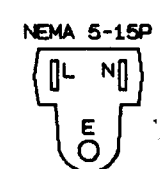
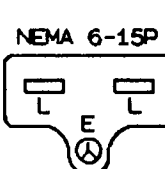

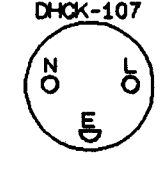
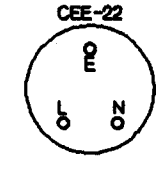
		Option No.
	HP Part Number 8120-1351; 250 V, 13A, 1 ϕ plug rating. For use in United Kingdom, Cyprus, Nigeria, Zimbabwe, Singapore.	900
	HP Part Number 8120-1369; 250 V, 10A, 1 ϕ plug rating. For use in Australia, New Zealand.	901
	HP Part Number 8120-1689; 250 V, 10/16A, 1 ϕ plug rating. For use in East and West Europe, Egypt	902
	HP Part Number 8120-1378; 125 V, 15A, 1 ϕ plug rating. For use in Canada, Japan, Mexico, Philippines, Taiwan, Saudi Arabia, UL approved in United States of America.	903
	HP Part Number 8120-0698; 250 V, 15A, 1 ϕ plug rating. For use in Canada, UL approved in United States of America.	904
	HP Part Number 8120-2104; 250 V, 10A, 1 ϕ plug rating. For use in Switzerland.	906
	HP Part Number 8120-2956; 250 V, 10A, 1 ϕ plug rating. For use in Denmark.	912
	HP Part Number 8120-4211; 250 V, 10A, 1 ϕ plug rating. for use in India, Republic of South Africa.	917
NOTE: All plugs are viewed from connector end. L = Line or Active Conductor (also called "live" or "hot") N = Neutral or Identified Conductor. E = Earth or Safety Ground		

Figure 3-4. Power Cord Configuration

CAUTION

Make sure the line fuse is correct according to Table 3-1.

3-16. FUSE SELECTION.

3-17. Verify that the correct ac line fuse is installed for the voltage range which has been selected. Refer to Table 3-1 for fuse ratings and part numbers.

Table 3-1 AC Line Fuse Selection

Line Voltage	Fuse Rating	HP Part Number
100/120V	1AT 250V	2110-0457
220/240V	0.5AT 250V	2110-0458

3-18. Grounding Requirements**WARNING**

The line power cord and power outlet must have a protective earth (ground) terminal. Serious shock hazard leading to injury or death may result if the plotter is not properly grounded.

3-19. To protect operating personnel, the plotter must be properly grounded. The plotter is supplied with a three-conductor power cable which, when connected to an appropriate power outlet, grounds the plotter. To preserve this protection feature, do not operate the plotter from a power outlet which has no grounded connection.

3-20. Switch Settings

NOTE

Interface switches are read only at power-up. If switch settings are changed, power must be cycled OFF (O) and then ON (I).

3-21. For the HP 7570 to properly communicate with the controller, rear panel switches must be set according to the interface option installed. Refer to the appropriate interface information.

3-22. RS-232-C Interface

3-23. The switches 0 through 5 must be set to match the data transmission characteristics of the controller. Refer to the controller documentation or contact operations personnel for the system. Switch 6 is set for the type of installation. This may be "End Line", in which case the switch is set to 0, or between a mainframe and terminal "Eavesdrop", in which case the switch is set to 1. Switches 7 and 8 may be set for particular operating modes. Refer to the Operating and Programming manual for details. Switch 11 is used to set the plotter to a test mode. Refer to Chapter 8 for complete test information. The factory settings for the switches are illustrated in Figure 3-5.

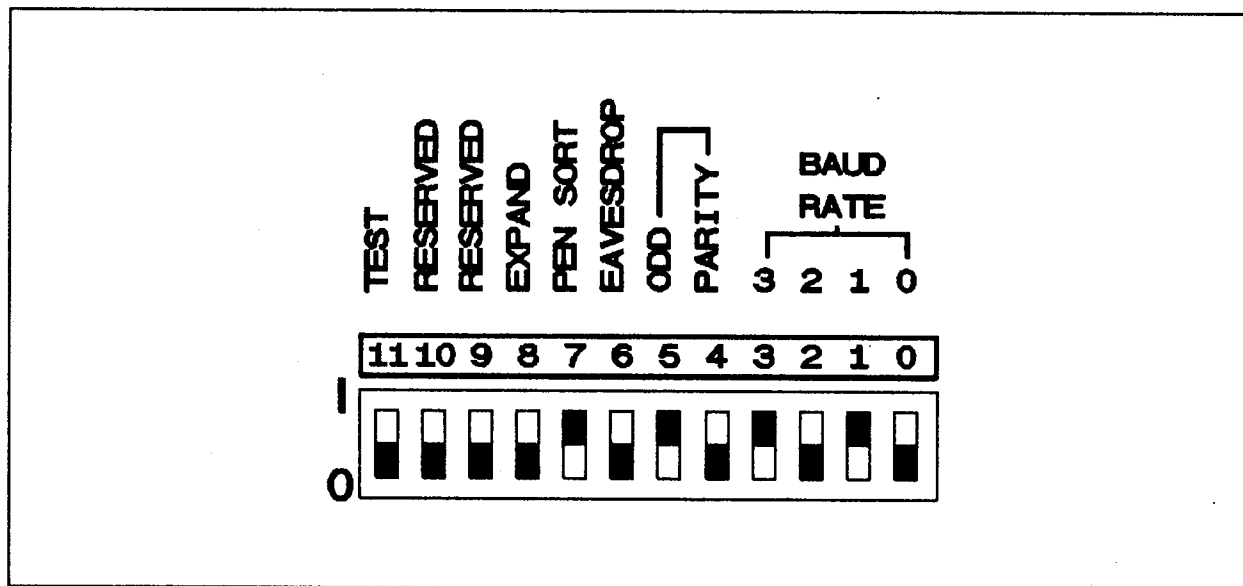


Figure 3-5. Rear Panel Switches, RS-232-C

3-24. HP-IB Interface

3-25. With the alternate interface module installed, the HP-IB address switch must be set. The switches 0 through 4 may be set to any of 32 possible combinations. Switch 5 must be in the OFF (down) position. Switches 7 through 10 on the RS-232-C interface switch panel are still active when using the HP-IB interface. See Figure 3-6.

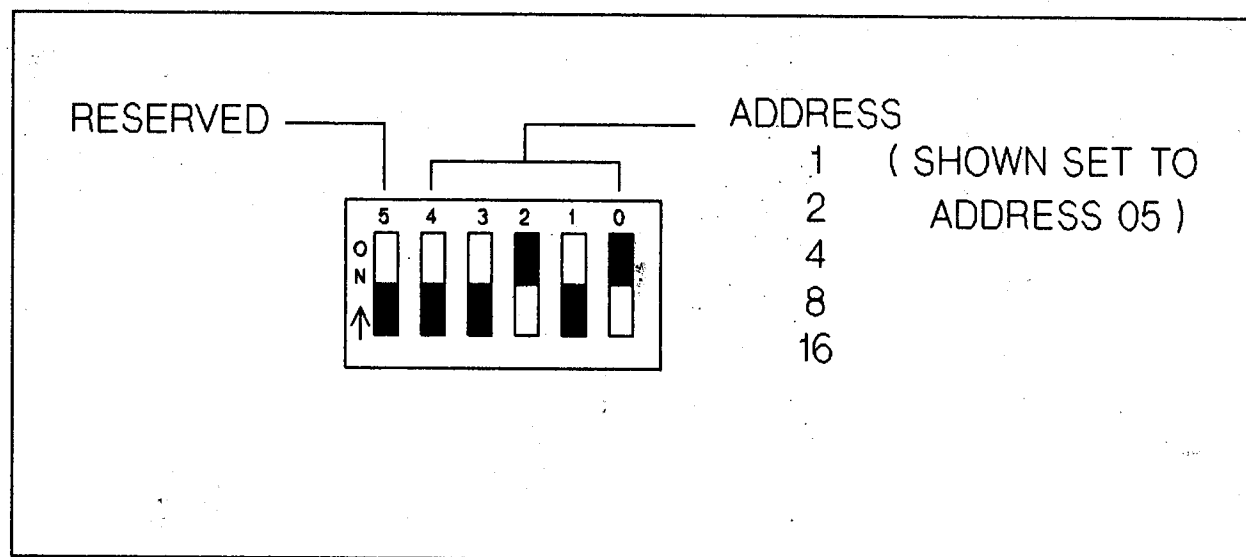


Figure 3-6. Rear Panel Switches, HP-IB (IEEE-488)

3-26. Interconnection

3-27. The interface cable required to connect the plotter to the controller is determined by the type of interface installed in the plotter and the type of controller being used. The standard interface is the RS-232-C/CCITT V.24 serial interface with an optional HP-IB (IEEE-488) interface. Refer to Table 3-2 for available cables.

Table 3-2. Interface Cables

Interface	Part Number	Description
RS-232-C	HP 17355M	Male to male - DCE - 3 metres - straight through
	HP 17355D	Male to female - DCE - 5 metres - straight through
	HP 17255D	Male to female - DTE - 1 metre - modem eliminator type
	HP 17255M/ HP 13242G	Male to male - DTE - 1.5 metres - modem eliminator type
	HP 17455A	Male to M/F - Eavesdrop - 1 metre - Y cable
	HP 24542G	Male to female - DTE - 3 metres - 25-pin to 9-pin
HP-IB	HP 10833A/ B/C	HP-IB (IEEE-488) A is 1 metre, B is 2 metres, C is 3 metres.

CAUTION

Turn the plotter line switch OFF (O) and remove the ac line cord before connecting the plotter interface cable

3-28. To connect the interface cable, proceed as follows:

- a. Turn OFF (O) the plotter and remove the ac line cord.
- b. Carefully align the cable connector with the connector on the plotter, and insert the connector.
- c. Tighten the locking screws to secure the connector.
- d. Connect the ac line cord and switch the plotter ON (I).

3-29. PLOTTER SELF-TEST PROCEDURES

3-30. Power-On Self-Test

3-31. When ac line voltage to the plotter is turned ON (I) a series of built-in tests are automatically performed to verify proper plotter operation. The test sequence will run either to completion, at which time normal plotter operation will begin, or to an error condition. An error will cause the test to stop, which prevents normal plotter operation. The front panel LEDs will display failure information. See Figure 3-7. Two possible error conditions may be displayed. In the first, the LED failure display will be flashing on and off. This indicates that the test circuitry received bad data from a particular portion of the circuitry. In the second condition, the LED error display will remain on steadily. This indicates no response from some portion of the circuitry. The only exit from an error condition is to turn OFF (O) ac power to the plotter. Diagnostic information is listed with the test steps in Table 3-3.

3-32. During operation of the plotter the two servo systems are continuously being monitored. If an error condition occurs the particular servo will be shut down, and the front panel LEDs will display a flashing error code.

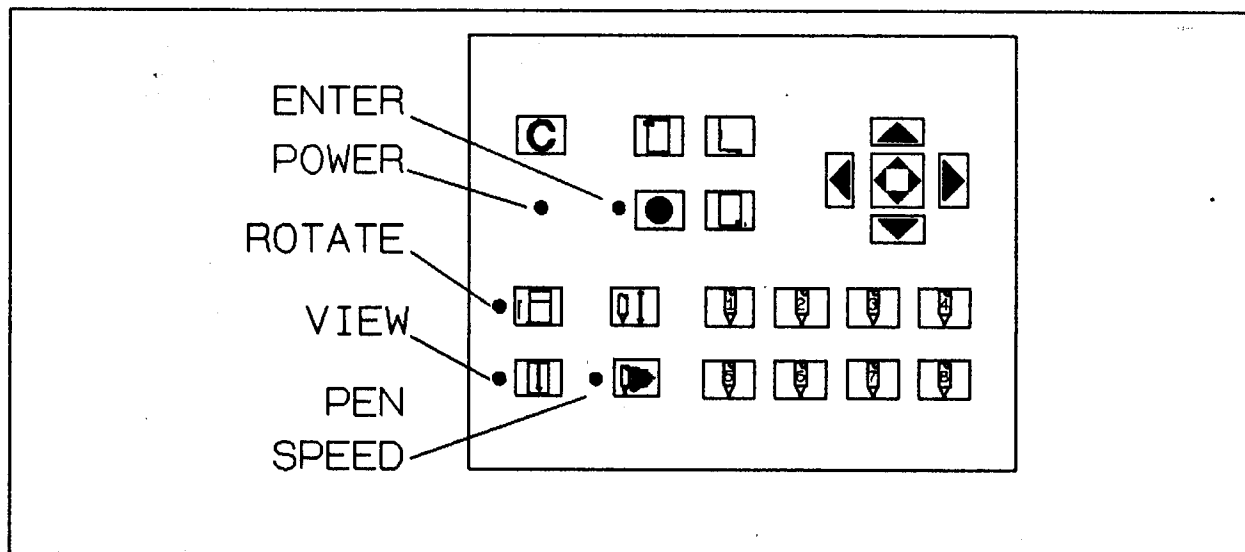


Figure 3-7. Front Panel LEDs

Table 3-3. Power-On Self-Test

Step	Test	Indication
0.	Power ON, Reset Condition	All LEDs ON (This step will not cause the test to stop.)
1.	Front panel LEDs	LEDs cycle one at a time; VIEW, ROTATE, ENTER, & SPEFD.
2.	Slave ROM Test	SPEED LED on steadily or flashing, 4 Kbyte SLAVE ROM failed.
3.	Slave RAM Test	VIEW LED on steadily or flashing, 128 byte SLAVE RAM failed.
4.	Support IC Test	VIEW & SPEED LEDs on steadily or flashing, Support IC failed
5.	Master/ Slave microprocessor handshake	ENTER LED on steadily, slave microprocessor fails to respond ENTER LED flashing, slave & master microprocessor handshake failed.
6.	Master external ROM Test	SPEED & ENTER LEDs on steadily or flashing 4 Kbyte external ROM, RAM, latch, or microprocessor failed.
7.	Master internal RAM Test	ENTER & VIEW LEDs on steadily or flashing, 256 byte Master microprocessor RAM failed.
8.	Master external RAM Test	ENTER, VIEW & SPEED LEDs on steadily or flashing, 32 Kbyte master RAM failed.
9.	Option ROM Checksum	ROTATE LED on steadily or flashing, option ROMS failed. *
	Passed	All LEDs ON then all OFF.
	Initialization	
10.	X-Servo Drive Test	ROTATE & SPEED LEDs flashing, X-Servo failure
11.	Y-Servo Drive Test	ROTATE & VIEW LEDs flashing Y-Servo failure

* If an option module is installed.

3-33. Demonstration Plot

3-34. The built-in demonstration plot will indicate with a high degree of confidence that the plotter is functioning properly. The plot includes characters and lines for checking line quality and pen picking. To run the test, proceed as follows:

- a. Connect the plotter to the ac line and turn the plotter ON (I).
- b. Load either ISO A1 (D) or A2 (C) paper into the plotter.
- c. Install a loaded carousel in the plotter.
- d. Press the P1 and P2 pushbuttons on the plotter front panel simultaneously.
- e. When the plot is complete the plotter will move the paper to the view position and remain in the READY state. The demonstration plot is illustrated in Figure 3-8.

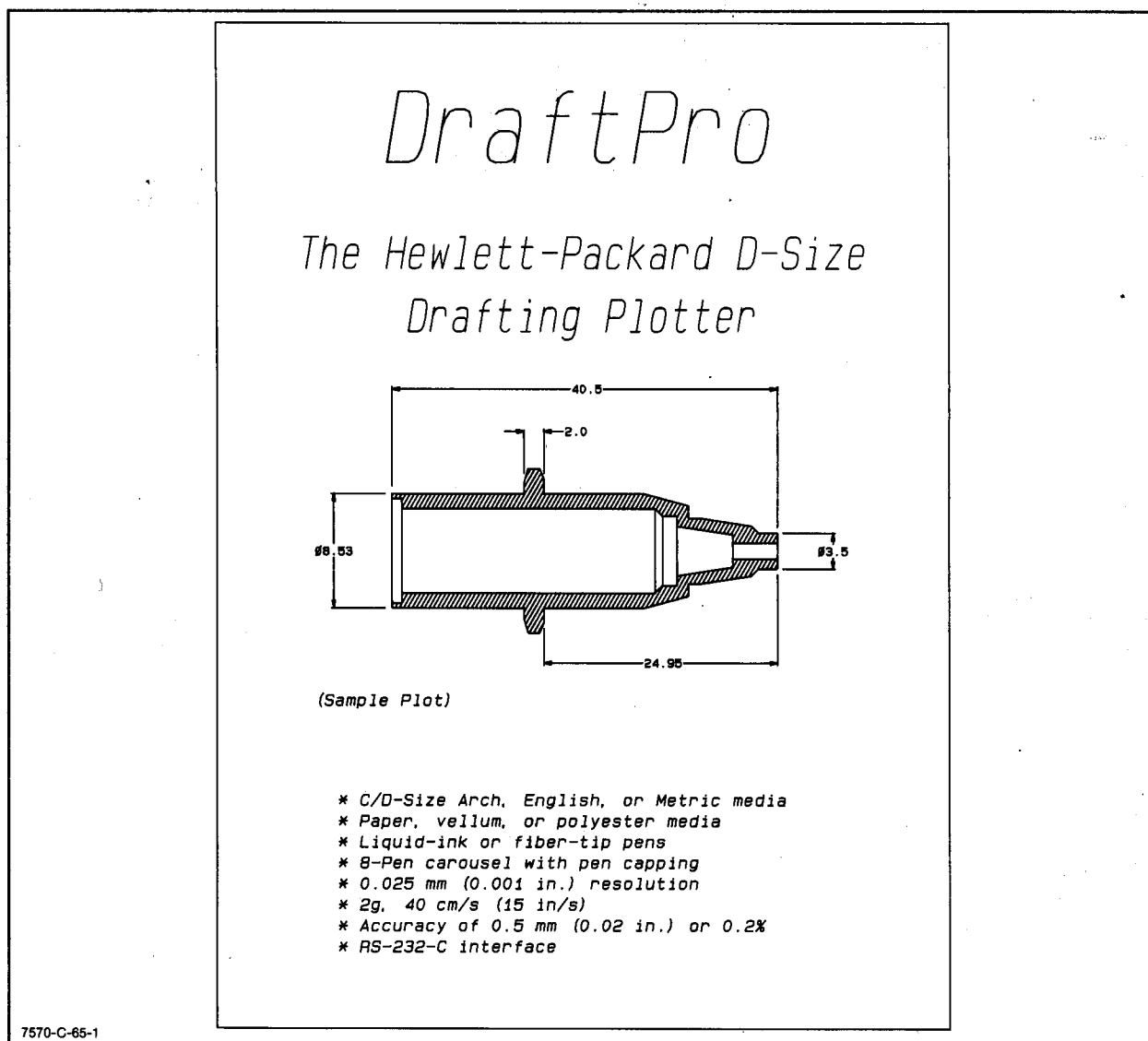


Figure 3-8. Demonstration Plot

3-35. USER INFORMATION/OPERATION

3-36. Pen Loading

3-37. Pen carousels designed for fiber pens or drafting pens are available for use with the HP 7570. A label on the top of each carousel identifies the type of pens to be used. The carousels differ only in the type of rubber capping boot. The plotter cannot distinguish between the types of carousel and will store either type of pen in the carousel without damage. However the pens will not be tightly capped if in the incorrect carousel and will dry out quickly. Each carousel is capable of holding and automatically capping up to eight pens. A selected pen will be automatically returned to the carousel and capped if it has been left in the pen holder for a period of time. This feature may be disabled by program control.

3-38. Pens are loaded as follows:

- a. Select the proper carousel for the type of pens to be loaded, either fiber tip or drafting pens. The pen type is indicated on the metal disc at the top of the carousel.
- b. Locate pen position "1" on the carousel.
- c. Select the pen to be loaded in position "1" and remove the storage cap.
- d. Press down on the pen capper arm and insert the pen. See Figure 3-9.
- e. Repeat this procedure for each desired pen position on the carousel.

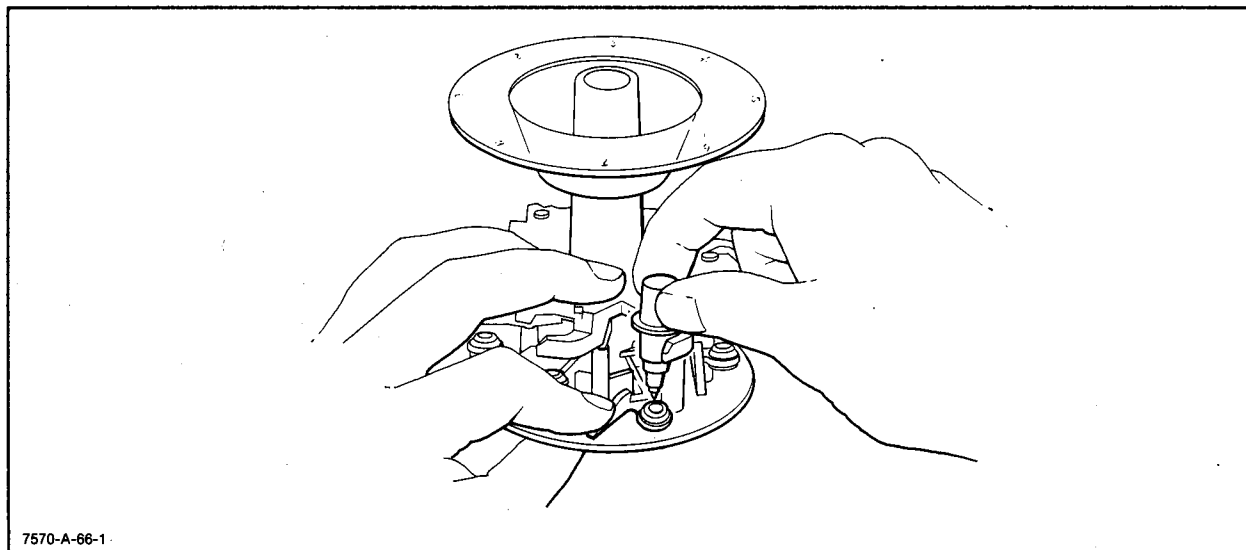


Figure 3-9. Loading Pens

3-39. The carousel is loaded into the plotter as follows:

- a. Lower the carousel into the opening in the left-hand chassis.
- b. Manually rotate the carousel until it fully seats on the alignment lugs on the carousel turntable.

- c. When power is applied to the plotter, the pen holder will move to the left and the carousel will rotate to locate pen 1.

3-40. Paper Loading

3-41. The HP 7570 is capable of drawing on either paper, double-matte polyester film, or vellum. The media size may be either ISO A2 or A1, or ANSI C or D.

3-42. To load paper into the plotter proceed as follows:

- a. Verify that the interface cable and ac line cord are properly connected.
- b. Set the ac line switch to the ON (I) position.
- c. Raise the pinch wheels with the paper load lever located at the left side of the plotting area. See Figure 3-10 detail A.
- d. Insert the paper under the pinch wheels and align it with the left-hand paper guide. See Figure 3-10 detail B.
- e. Set the right-hand moveable pinch wheel to the proper location for the paper to be loaded. See Figure 3-10 Detail C.
- f. Lower the pinch wheels by use of the paper load lever.
- g. The plotter will begin an initialization sequence to sense the paper dimensions and set plotting limits.

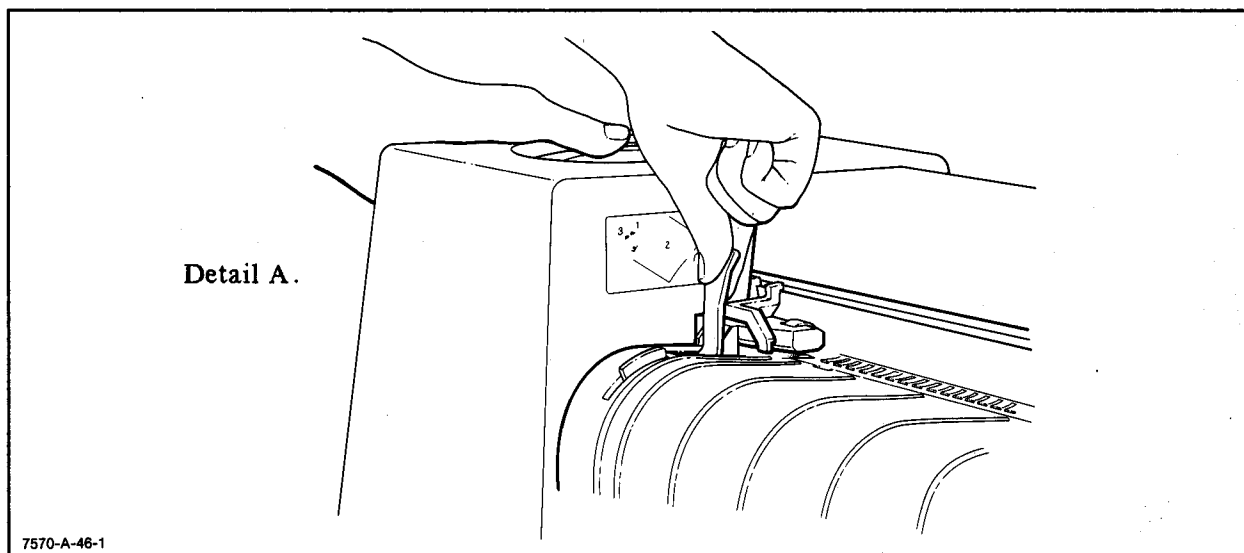


Figure 3-10. Loading Paper

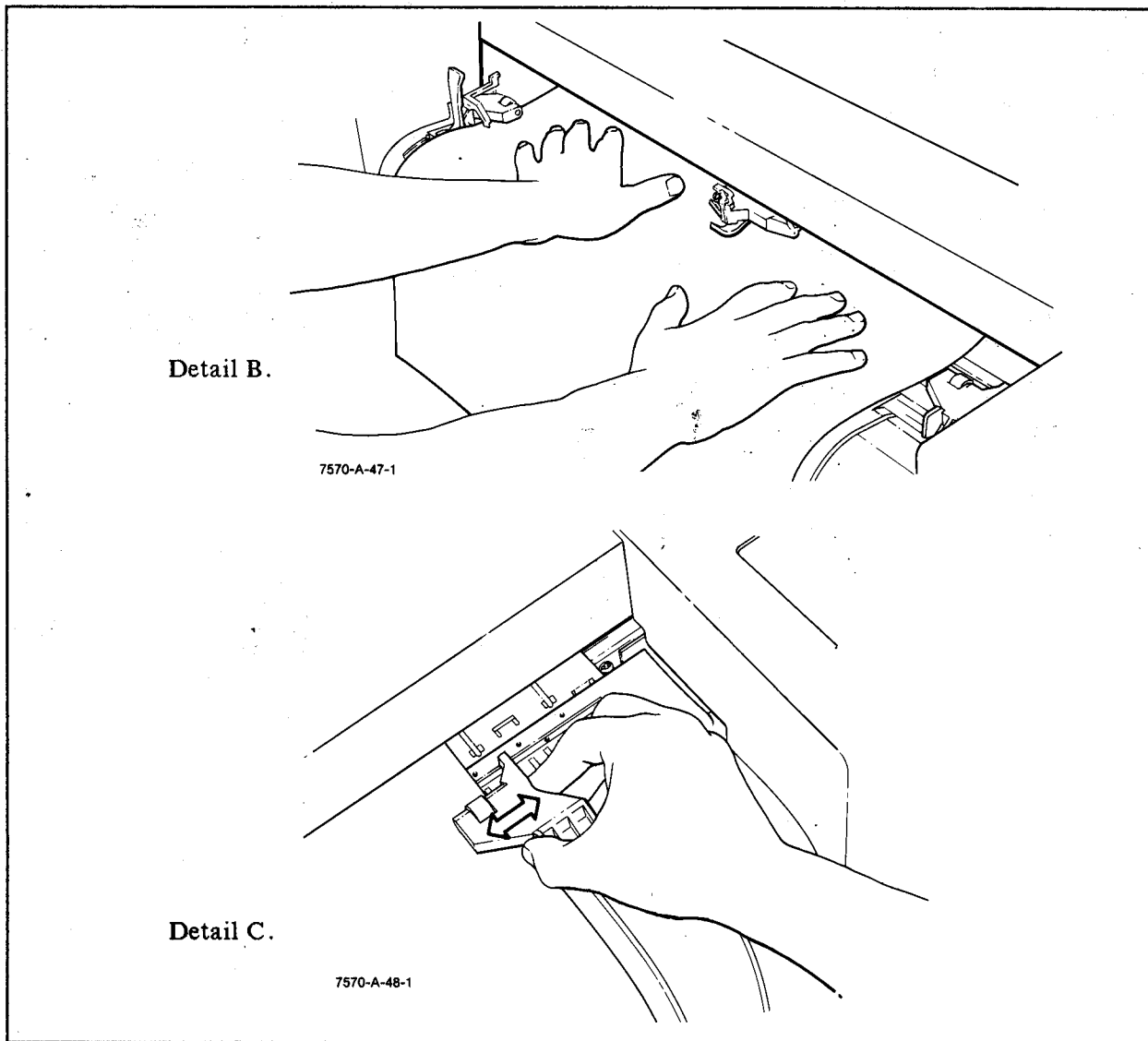


Figure 3-10. Loading Paper (continued)

3-43. Front Panel Controls

3-44. The HP 7570 front panel consists of 22 pushbutton switches and 5 light emitting diodes. The front panel is illustrated in Figure 3-11.

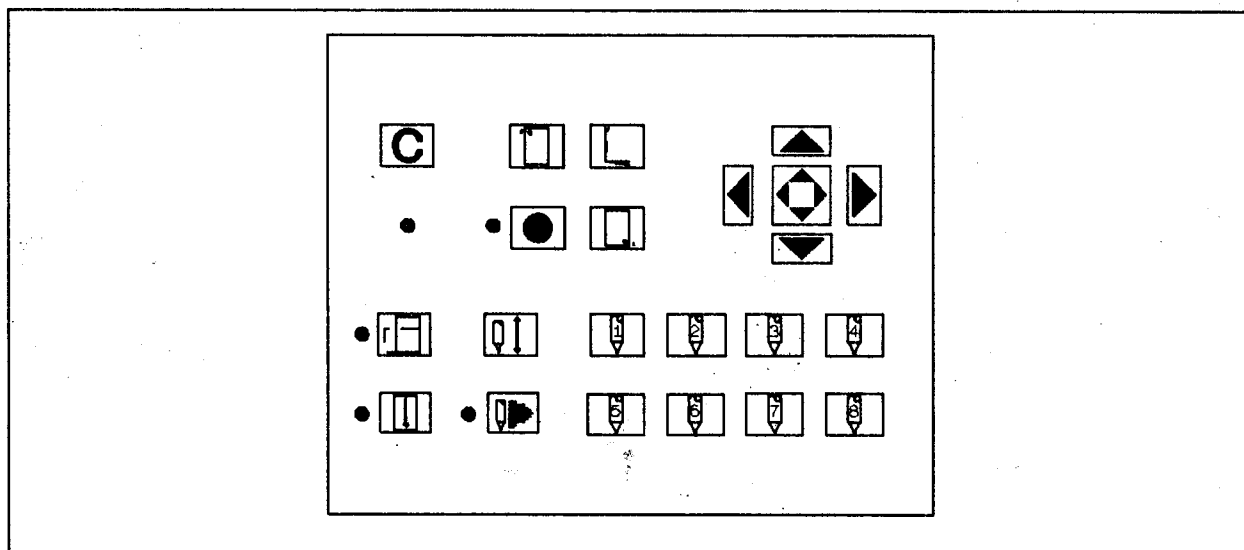


Figure 3-11. HP 7570 Front Panel

3-45. The function of the front panel controls is as follows:



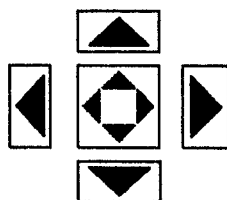
- a. Clear---Pressing the CLEAR button clears the HP-GL buffer, cancels any pending output from the plotter and resets the parser. When pressed with the ENTER button a "RESET" function is performed. The plotter is set to a "power on" condition. This is equivalent to the HP-GL "IN" command.



- b. P1/P2---Pressing P1 or P2 causes the pen to be raised and moved to the current coordinates of the P1 or P2 point. At power-up the default location of P1 is as shown at the left. In all cases the P2 location is in the corner opposite P1. Pressing either P1 or P2 simultaneously with ENTER establishes the current pen location as the new location for that point.



- c. Axis Align---The function of Axis Align is to allow the user to set the physical axis of the plotter to a preprinted grid line on the plotting media. The axis align point is along the X-axis from the P1 coordinate points. The maximum allowable axis change is 6 degrees. When pressed with ENTER, the current location of the pen becomes the new alignment point.



- d. Cursors and Fast---These five buttons are used to move the pen within the plotting area as follows:
1. Pressing any cursor pushbutton moves the pen in the indicated direction.
 2. Pressing adjacent pushbuttons moves the pen at a 45 degree diagonal between the two directions.
 3. When Fast is pressed in conjunction with any of the cursor buttons, the pen moves approximately four times faster.
 4. Pressing Fast by itself suspends plotting as long as the button is held down.

NOTE

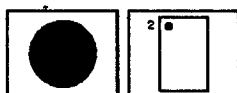
Pressing any cursor button during plotting will cause the plot to stop, the pen will make the appropriate move and plotting will resume at the new location.



- e. Enter---This multi-purpose button is used for resetting the plotter to power-up default condition, digitizing, changing paper size and the location of the P1 and P2 scaling points, rotating the coordinate system, and storing the pen. To initiate the desired action the Enter pushbutton must be pressed before the appropriate function button is pressed.



- f. Enter + Clear---Resets the plotter. This is equivalent to an "IN" command.



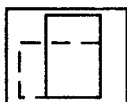
- g. Enter + P1/P2 or Axis Align---Defines the current pen location as the new P1, P2 or Axis Align scaling point. Changing the position of P1 also changes the positions of P2 and AA so that the vector from P1 to P2 and to AA remain the same.



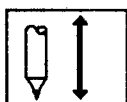
- h. Enter + Axis Align---This has the restriction that the magnitude of the angle between the default X axis and the new X axis be less than 6 degrees. If a greater angle is attempted, the input will not be accepted, and the Enter LED will continue to blink.



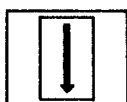
- i. Enter + Pen#---Stores the pen currently held in the location specified by the number. If that location is not available the pen will be stored in the next lowest numbered empty location. Enter (digitizing)---When the plotter receives a "DP" command the Enter LED will blink. This indicates that the digitizing mode has been initiated. When Enter is pressed the actual X- and Y-coordinates and the pen status will be stored in the plotter output buffer. The data are transmitted to the computer when the OD command is received. Refer to the programming manual for complete details on digitizing.



- j. Rotate---The Rotate pushbutton toggles the 90 degree rotate function ON or OFF. This function may also be controlled by the "RO" command. When the rotate function is activated, the Rotate LED will be ON and the actual pen position becomes the new graphics position.



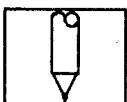
- k. Pen Up/Down---This pushbutton toggles the current position of the pen holder. This pushbutton will override program control of the pen holder.



- l. View---When the VIEW pushbutton is pressed, the current vector is completed, plotting is suspended, and the plotting media is moved forward to allowing the operator to view the plot. When pressed again plotting will be resumed from the point where suspended.



- m. **Pen Speed---**This pushbutton is used with the Pen Select pushbuttons to set the plotting speed. To set the speed, press the Pen Speed pushbutton. This will cause the LED at the left of the button to flash. Press one of the eight Pen Select pushbuttons. The plotting speed, in cm/s, will be 5 times the number on the Pen Select pushbutton. The Pen Speed LED will be OFF after the Pen select button is pressed. The default pen speed is 40 cm/s. The speed can be selected from 5 cm/s to 40 cm/s in increments of 5.



- n. **Pen Select (1-8)---**Pressing any Pen Select button causes the plotter to pick the corresponding numbered pen from the carousel, if that pen is loaded. The plotter stores any pen currently held in the pen holder before it picks the the newly selected pen. The old pen is stored in the carousel in the position from which it came, or into the next lowest- numbered empty position if its original position is not available. After the pen is picked, the pen holder returns to its previous position on the platen. If a plot is in progress when a PEN pushbutton is pressed, plotting is suspended until the new pen is selected and the pen holder returns to its previous location. The first pen pick after power is applied to the plotter will cause the carousel to perform an initialization operation. It will rotate to the PEN 1 position and then to the selected pen. The Pen Select pushbuttons are also used with the Pen Speed pushbutton to set the plotting speed.



- o. **Pressing Enter with any Pen Select button** causes the plotter to store the present pen in that numbered position in the carousel, if that position is available. If the selected position is not available the pen will be stored in the next lowest-numbered empty position. The pen holder will then return to its previous position on the platen.

3-46. Front Panel Indicators

3-47. There are five LEDs on the front panel to indicate various conditions to the operator. See Figure 3-7 for the indicator locations. The indicators are:

- a. **Line LED---**The Line LED is controlled directly by the power supply. When lit, it indicates that power is applied and that the LINE switch is in the ON (I) position.
- b. **Enter LED---**A multi-function indicator. May be ON, BLINKING, or OFF.
 1. **ON-** Indicates that the plotter is in the digitize state. The plotter has received a "DP" command. When the Enter button is pressed the actual X- Y- coordinates and the pen UP/DOWN status will be stored for transmission to the controller.
 2. **BLINKING---**When the Enter LED is blinking, it indicates that the Enter pushbutton has been pressed. This is the first step in a two button sequence. These sequences are explained above with the Enter pushbutton. If the Enter pushbutton is pressed a second time, the LED will turn OFF and the sequence canceled.
- c. **90 Degree Rotate LED---**When ON this LED indicates that the plot axes have been rotated 90 degrees, either by front panel pushbutton control or by command from the controller.

- d. View LED---A dual purpose indicator. When on steady it indicates that the plotter is in the View state. When flashing, the LED indicates that an I/O error or an unmasked HP-GL error has occurred. Error signaling cannot occur when the plotter is in the View state.
- e. Pen Speed LED---When the Pen Speed LED is blinking, it indicates that the Pen Speed Pushbutton has been pressed. This is the first step in a two button sequence. The next step is to press one of the Pen Select pushbuttons to change the plotting speed. Pressing the Pen Speed pushbutton again without pressing a Pen Select pushbutton will cancel the pen speed input and turn off the LED without making a pen speed change.

3-48. Rear Panel Features

3-49. The rear panel switches and connectors on the HP 7570 are configured for the RS-232-C (CCITT V.24) Serial Interface. An HP-IB Interface (IEEE-488) is also available for the plotter, and the rear panel features for that interface will also be covered.

3-50. RS-232-C SWITCH SETTINGS.

3-51. The following features are found on the plotter rear panel: See Figure 3-12.

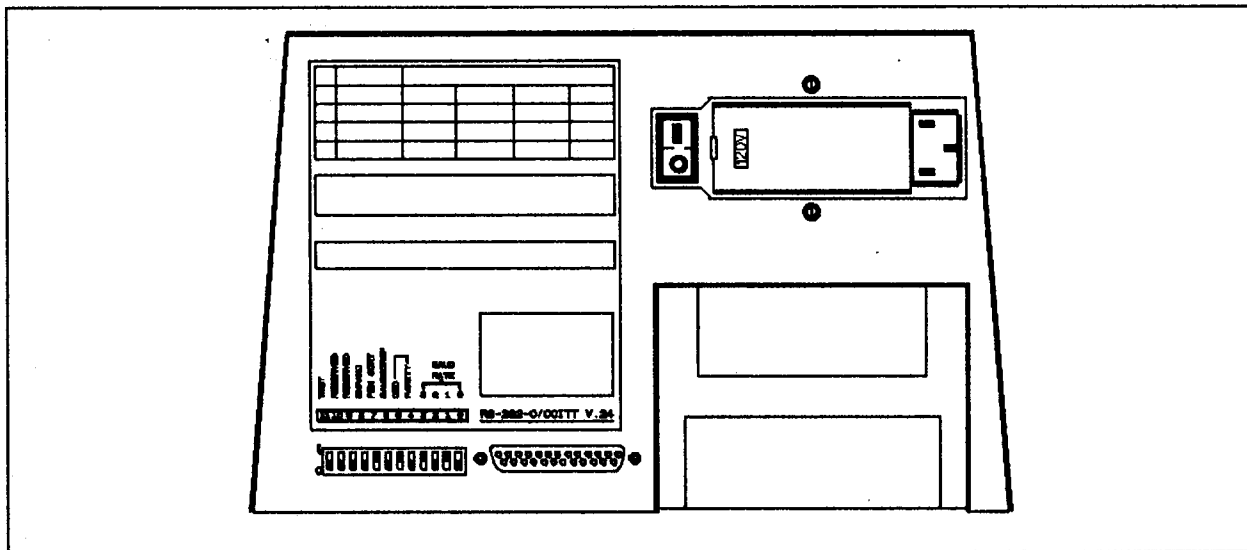


Figure 3-12. HP 7570 Rear Panel

- a. The RS-232-C/CCITT V.24 compatible, 25-pin, female connector is used to connect the plotter to the host computer.
- b. Baud Rate 0-3---These four switches are used to select the baud rate which corresponds with the data transmission rate. The baud rate is selected by setting switches 0 through 3 to the appropriate binary bit positions defined in Table 3-4.

Table 3-4. Baud Rate Switch Settings

Rate	0	1	2	3	Stop Bits
75	1	0	0	0	2
110	0	1	0	0	2
150	0	0	0	0	2
150	1	1	0	0	1
200	0	0	1	0	1
300	1	0	1	0	1
600	0	1	1	0	1
1200	1	1	1	0	1
2400	0	0	0	1	1
4800	1	0	0	1	1
9600	0	1	0	1	1

- c. Parity-- When ON this switch determines that bit 7 will be interpreted as a parity bit. When OFF bit 7 is read as data. With Parity OFF, the output will have bit 7 set or cleared, depending upon the ODD/EVEN switch. ODD=SET EVEN=CLEARED.
- d. Odd-- If parity is set ON, this switch determines if the checking will be ODD (switch ON) or EVEN (switch OFF).
- e. Eavesdrop--- This switch selects either DIRECT (end of line) or eavesdrop operation for the plotter.
 - 1. Off position--This setting is used when the plotter is directly connected to a computer in an end line configuration. In this position the plotter is programmed ON at power-up.
 - 2. On position--This setting is used when the plotter is connected between a computer and a terminal in an Eavesdrop configuration. The plotter powers up in a programmed OFF state. In this state the plotter will pass information between the terminal and computer. Upon receiving a PLOTTER ON instruction the plotter will respond to all known HP-GL instructions.

NOTE

The plotter ac LINE switch must be ON (I) to have communication between the terminal and computer.

- f. Pen Sort--When ON (I) this switch enables the pen sort algorithm which minimizes pen picking by drawing all vectors of a given color, which are in the buffer, before changing pens. This feature may be enabled or disabled programmatically if the switch is OFF (O).
- g. Expand-- In the ON (I) position a fixed amount is added to the plotting area, enabling the plotter to draw under the pinch wheel positions.
- h. Reserved-- These two switches are used to select certain internal diagnostic features. For normal operation they must be in the OFF (O) position

- i. Test-- When set to the ON (I) position internal diagnostics are selected. When this function is selected, many of the front panel switch functions are changed to select diagnostic routines. Refer to Chapter 8 for further information.

3-52. HP-IB (IEEE-488) REAR PANEL FEATURES.

3-53. The following features are found on the HP-IB rear panel: See Figure 3-13.

- a. The HP-IB interface uses a 24-pin connector to interconnect the plotter and the host computer.
- b. Address Switches 0 - 4--These five switches are used to establish the plotter address. The address is selected by setting each switch to the appropriate binary bit position. The plotter is set to an address of 05 at the factory. This corresponds to a listen character of % and a talk character of E. The plotter is set in a listen-only mode when all five switches are set to I. In this mode the plotter does not have an address, but listens to all data transmitted on the bus. In this mode the plotter cannot be placed in a talk-active state and will not respond to a serial or parallel poll.
- c. Reserved Switch 5--This switch is reserved and must remain in the down (OFF) position for normal plotter operation.

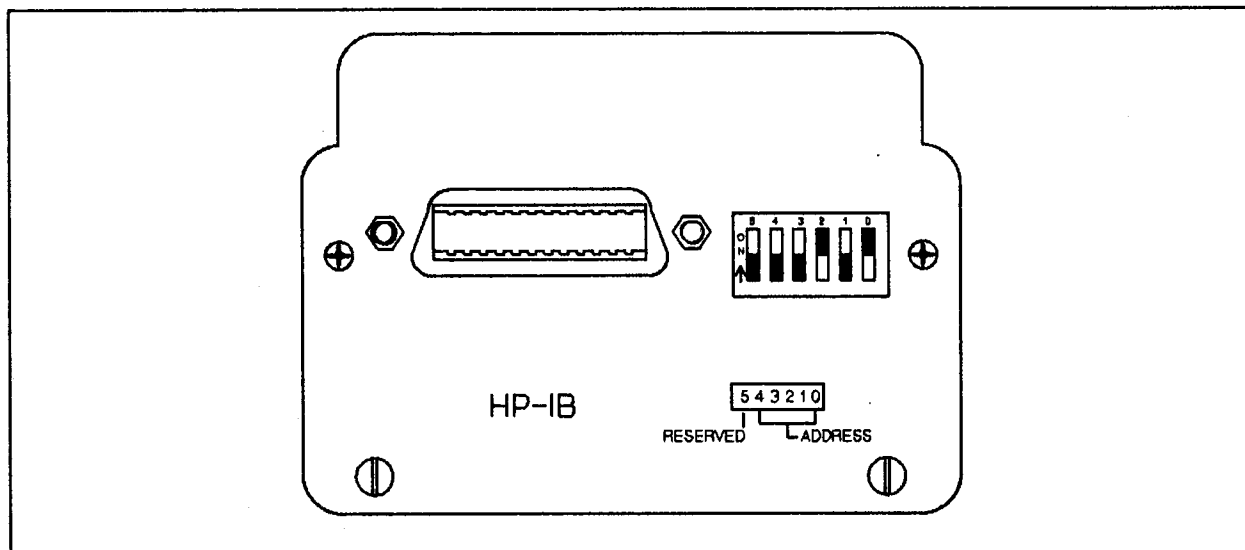


Figure 3-13. HP 7570 HP-IB Rear Panel

3-54. Plotter Instruction Set

3-55. The instructions in Table 3-5 from the HP-GL Instruction Set are implemented in the HP 7570. All HP-GL instructions enter the plotter buffer and are executed on a first-in first-out sequence. The Device Control Instructions in Table 3-6 do not enter the buffer, but are instead implemented immediately upon receipt.

Table 3-5. HP 7570 HP-GL Instruction Set

VECTOR GROUP

PA x,y(x,y,...))

PD "

PU "

PR "

PD "

PU "

PD

PU

AA x,y,arc(chord)

AR x,y,arc(chord)

CI radius(chord)

PLOT ABSOLUTE (d)

AFTER PEN DOWN (d)

AFTER PEN UP (d)

PLOT RELATIVE

AFTER PEN DOWN (d)

AFTER PEN UP (d)

PEN DOWN

PEN UP

ARC ABSOLUTE x,y (d); arc,
chord tolerance(d)ARC RELATIVE x,y (d); arc,
chord tolerance(d)

CIRCLE radius(d); chord tolerance(d)

CHARACTER GROUP

CA n

CP spaces,lines

CS n

DI run, rise

DR run, rise

LB c ... c

SA

SI wide,high

SL tangent angle

SR wide, high

SS

UC x,y,pen(...)

DT c

LO n

BL c...c

PB

ES s,l)

OL

DV n

DESIGNATE ALTERNATE CHARACTER SET n (i)

CHARACTER PLOT (d)

DESIGNATE STANDARD CHARACTER SET n (i)

DIRECTION ABSOLUTE (d)

DIRECTION RELATIVE (d)

LABEL ASCII STRING (c)

SELECT ALTERNATE CHARACTER SET

SIZE ABSOLUTE (CHARACTER SIZE) (d)

SLANT ABSOLUTE FROM VERTICAL (d)

SIZE RELATIVE (d)

SELECT STANDARD CHARACTER SET

USER DEFINED CHARACTER (i)

DEFINE TERMINATOR (LABEL TERMINATOR) (c)

LABEL ORIGIN (i)

BUFFER LABEL (c)

PRINT BUFFER LABEL

EXTRA SPACE s-between characters (d)

l- between lines(d)

OUTPUT LABEL BUFFER LENGTH (d ret)

SPECIFY LABEL DIRECTION VERTICAL (i)

LINE TYPE GROUP

LT t,l)

SM c

SM c c

SP n

SG n

VS v,n)

LINE TYPE (LENGTH) (d)

SYMBOL MODE (c)

SYMBOL MODE Kanji (c,c)

SELECT PEN (i)

SELECT (PEN) GROUP (i) (executed like SP)

VELOCITY SELECT (pen number) (i)

Table 3-5. HP 7570 HP-GL Instruction Set (cont.)

DIGITIZE GROUP

DC	DIGITIZE CLEAR
DP	DIGITIZE POINT
OD	OUTPUT DIGITIZED POINT (i ret)

AXES GROUP

TL tp,(tn)	TICK LENGTH (d)
XT	X-AXIS TICK
YT	Y-AXIS TICK

CONFIGURATION AND STATUS GROUP

IW x1,y1,x2,y2	INPUT WINDOW (d)
OW	OUTPUT WINDOW
IP p1x,p1y(p2x,p2y)	INPUT P1/P2 (i)
OP	OUTPUT P1/P2 (i ret)
AP n	AUTOMATIC PEN OPERATIONS (i)
DF	DEFAULT VALUES
IM e,(s,(p))	INPUT MASKS E,S,P (i)
IN	INITIALIZE
OE	OUTPUT ERROR (i ret)
OS	OUTPUT STATUS (i ret)
OC	OUTPUT COMMANDED POSITION (i ret)
SC x1,x2,y1,y2	INTEGER SCALE (i)
RO n	ROTATE AXES (i)
CT n	CHORD TOLERANCE (i)
NR	VIEW STATE
OA	OUTPUT ACTUAL POSITION (i ret)
OH	OUTPUT HARDCLIP LIMITS (i ret)
OO	OUTPUT OPTIONS (i ret)
OF	OUTPUT FACTORS (i ret)
OI	OUTPUT IDENTIFICATION (i ret)
OT	OUTPUT CURRENT CAROUSEL (i ret)

POLYGON GROUP

RA x,y	RECTANGLE ABSOLUTE (d)
RR x,y	RECTANGLE RELATIVE (d)
WG radius,start angle, sweep angle,(chord angle)	FILL WEDGE (d,d,d(d))
EA x,y	EDGE RECTANGLE ABSOLUTE (d)
ER x,y	EDGE RECTANGLE RELATIVE (d)
EW radius,start angle, sweep angle,(chord angle)	EDGE WEDGE (d,d,d(d))
PM n	POLYGON MODE n
FP	FILL POLYGON
EP	EDGE POLYGON

(i) = integer (d) = decimal format (c) = ASCII character

Table 3-5. HP 7570 HP-GL Instruction Set (cont.)

The following instructions, if in proper format, generate no operation. If they are not in proper format they will generate an error indication.

AF	GP
AH	PG
AS	VA
EC	VN
FS	

Table 3-6. Device Control Instructions

HP-IB Interface

ESC.A	OUTPUT MODEL #, OUTPUT FIRMWARE REV. #
ESC.B	OUTPUT BUFFER SPACE
ESC.O	OUTPUT EXTENDED STATUS
ESC.E	OUTPUT EXTENDED ERROR
ESC.L	OUTPUT BUFFER SIZE WHEN EMPTY

RS-232-C Interface

ESC.M	SET OUTPUT MODE
ESC.H	SET HANDSHAKE MODE 1
ESC.I	SET HANDSHAKE MODE 2
ESC.N	SET EXTENDED OUTPUT AND HANDSHAKE
ESC.@	SET PLOTTER CONFIGURATION
ESC.J	ABORT DEVICE CONTROL INSTRUCTION
ESC.K	ABORT GRAPHIC INSTRUCTION
ESC.L	OUTPUT BUFFER SIZE WHEN EMPTY
ESC.B	OUTPUT BUFFER SPACE
ESC.E	OUTPUT EXTENDED ERROR
ESC.O	OUTPUT EXTENDED STATUS
ESC.P	DEFINE HANDSHAKE
ESC.Q	DEFINE MONITOR MODE
ESC.S	OUTPUT BUFFER SIZES
ESC.T	DEFINE BUFFER SIZES
ESC.(PLOTTER ON
ESC.)	PLOTTER OFF
ESC.Y	PLOTTER ON
ESC.Z	PLOTTER OFF

4-1. INTRODUCTION

4-2. This chapter contains information on keeping the HP 7570 in the best operating condition. Included are instructions for operator maintenance and cleaning, as well as electrical alignment.

4-3. EFFECT ON PRODUCT RELIABILITY

4-4. To maintain the plotter in the best operating condition it is recommended that the plotter be kept free of dust accumulation, ink and other contamination. The cleaning intervals will be determined by the local conditions where the plotter is operated and by the types of plotter supplies used. While accumulations of dust or ink on the plotter will probably not degrade the performance, dust or lint on the grit wheels will affect plotter operation. A build-up of lint or paper fibers on the grit wheels will allow the media to slip and to degrade the accuracy of the plot. As with any precision electronics equipment, proper maintenance will help to prolong the product life and create quality output..

4-5. CLEANING

WARNING

To prevent possible electrical shock or physical injury from moving mechanical parts, always turn the plotter OFF (O) and remove the ac line cord and the interface cable before performing any maintenance procedures.

Never allow water or other cleaning materials to come in contact with the electrical parts of the plotter

4-6. User Procedures

4-7. The following cleaning procedures can be performed by the plotter user. Follow normal safety precautions, and prevent water or other cleaning materials from entering the electronics enclosure of the plotter. If in doubt about any procedure, contact your local Hewlett-Packard sales representative or service personnel.

4-8. Cleaning of the exterior surfaces of the plotter should be done with a soft clean cloth, dampened with warm water. A bit of mild soap may be used if necessary. Wipe the surface dry after cleaning.

4-9. The plotter grit wheels should be cleaned by brushing the surface with a clean dry brush. A grit wheel brush or a tooth brush may be used to remove the paper fibers from the grit wheels.

4-10. The pen cappers in the carousel may be cleaned of ink by using a cotton swab dampened with warm water and mild soap. Isopropyl alcohol may be used to remove heavier contamination. Use caution not to tear the soft rubber pen cappers. Cleaning the capping mechanism will prevent ink colors from transferring when pens are changed.

4-11. Service Personnel Procedures

CAUTION

The following cleaning procedures should be performed only by trained service personnel.

4-12. Accumulations of dust or contamination on the interior of the electronics enclosure may be removed by opening the enclosure and blowing the dust away with compressed air, or vacuumed away with a small hand-held vacuum.

4-13. Any accumulation of contamination on the moving parts of the plotter may be removed by wiping with a soft dry cloth.

4-14. MECHANICAL ALIGNMENT

There are no mechanical alignments.

4-15. ELECTRICAL ALIGNMENT

There are no electrical alignments.

5-1. INTRODUCTION

5-2. The theory of operation of the HP 7570 will be covered at two levels. The first will be a simplified theory of the circuit operation to the block diagram level referring to major function blocks of the plotter. See Figure 5-1. The second level of discussion will be to the component level and will reference the schematic diagram of the plotter circuitry found in Chapter 12.

5-3. SIMPLIFIED THEORY OF OPERATION

5-4. The HP 7570 uses a dual microprocessor system to convert digital instructions into a graphic plot. The microprocessor receives instructions from either an internal ROM program or an external controller through the I/O (input/output) circuits. The microprocessor then issues data to the pen and paper drive servo system and to the pen control circuit to produce the plot. Figure 5-1 is a simplified block diagram of the 7570 plotter. The master microprocessor controls the I/O interface, memory circuits, and the graphics processing. The slave microprocessor monitors the front panel and rear panels, vector set up and the servo code. The two microprocessors communicate with each other through a six bit bus, with two handshake bits and four data bits.

5-5. The two drive motors are reversible dc motors with 500 line optical encoder discs on each motor shaft to transmit rotation data back to the servo IC which generates the pulse-width modulated drive signals. These drive signals are fed to the four half bridge motor drive circuits. One motor drives the grit wheels which move the plotting medium, while the other motor moves the pen across the plotting surface. The grit wheel motor is also shifted through a gear mechanism to rotate the pen carousel. The servo IC functions in response to data received from the slave microprocessor over the eight bit SAD bus.

5-6. The standard interface for the HP 7570 is the RS-232-C serial interface which communicates directly with the master microprocessor. The plotter is capable of Eavesdrop operation, controlled by rear panel switches. The switches also control baud rate and parity checking.

5-7. An optional HP-IB (IEEE 488-1978) interface cartridge is also available for the plotter. This optional cartridge provides an eight bit parallel interface. The interface function is controlled by the master microprocessor on the main PCA A1.

5-8. Memory circuits for the HP 7570 consist of 32 K by 8 ROM for program functions, an 8 K by 8 RAM for temporary storage of computations and I/O buffer. The 8 bit latch demultiplexes the address/data lines to provide the lower eight bits of the address.

5-9. An optional Kanji character set is available for the HP 7570. This character set is stored in optional ROM which is available with the HP-IB interface module. The characters occupy three 64K ROMs on the optional PCA.

5-10. The plotter power supply is an 80 watt hybrid supply, furnishing a 4.5 amp 32 volt unregulated supply for the motors and a switching supply which produces a 1.5 amp 5 volt supply for the plotter circuitry, and a +/- 12 volt supply for the I/O line drivers and other analog devices..

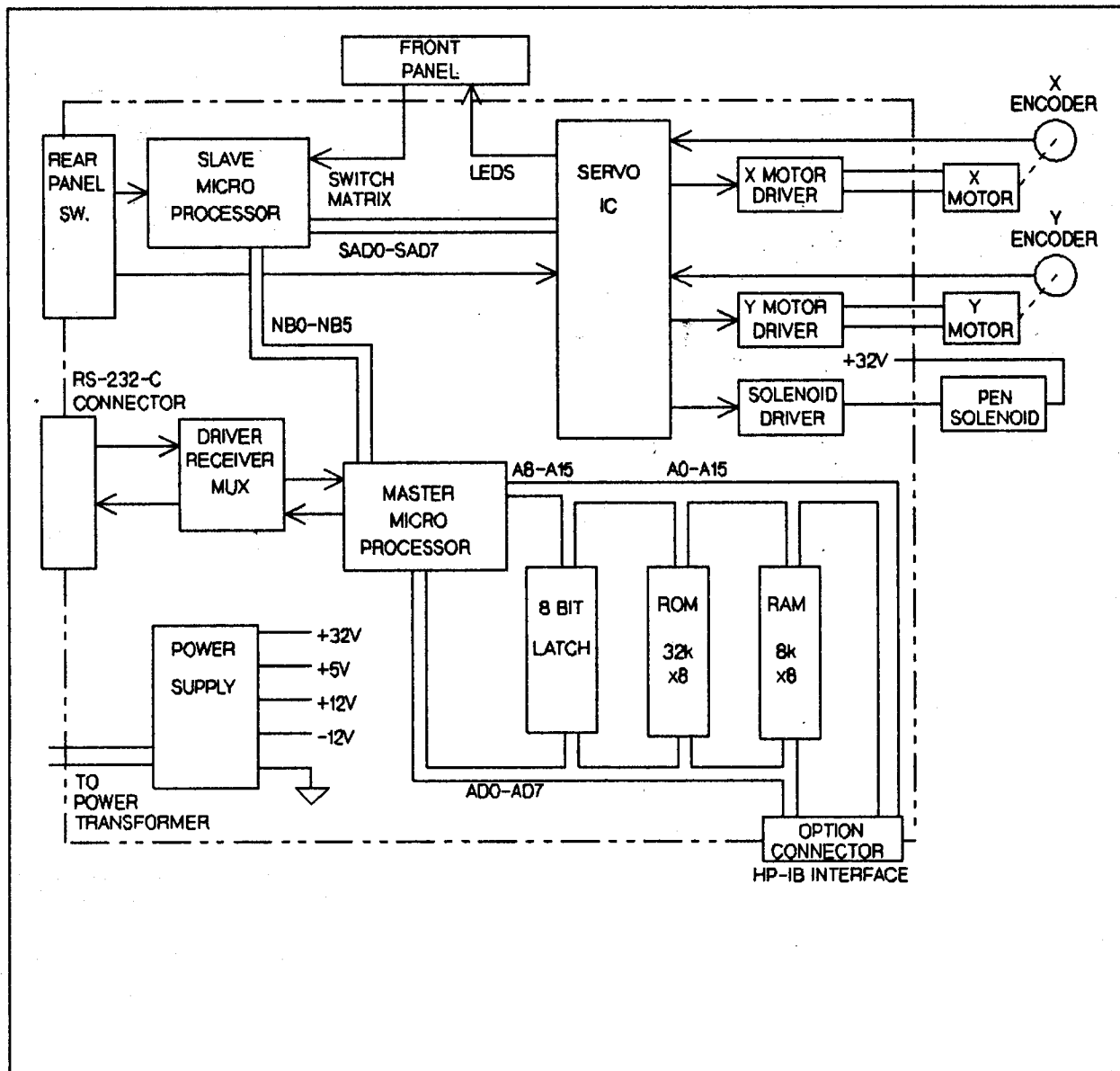


Figure 5-1. HP 7570 Simplified Block Diagram

5-11. DETAILED THEORY OF OPERATION

5-12. RS-232-C INTERFACE CIRCUITRY

5-13. The standard interface for the HP 7570 is RS-232-C. This I/O is an asynchronous full-duplex bit-serial interface for hardwired connection to a computer. The interface is fully compatible with both the EIA Standard RS-232-C and CCITT V.24. The interface functions to the connector are listed in Table 5-1.

Table 5-1. RS-232-C Interface Lines

PIN	SIGNAL NAME	RS-232-C	CCITT V.24
1	Protective Ground	AA	101
2	Transmitted Data	BA	103
3	Received Data	BB	104
4	Request to Send	CA	105
5	Clear to Send	CB	106
6	Data Set Ready	CC	107
7	Signal Common	AB	102
8	Received Line Signal Detector	CF	109
14	Secondary Transmitted Data	SBA	118
16	Secondary Received Data	SBB	119
20	Data Terminal Ready	CD	108.2

5-14. The HP 7570 uses a single port with a female connector mounted on the rear panel of the plotter. This circuit will support end line or single "Y" cable Eavesdrop mode with the plotter connected between the controller and the computer. Baud rates, selectable from 75 to 9600, and interface functions are selected by slide switches on the rear panel. The interface defaults to a hardwired handshake using 3 wire data communications and DTR.

5-15. **DATA I/O CIRCUITS.** Impedance matching and signal inversion are accomplished by the line receiver U3 and the line driver U1. The signal levels required for the external interface circuitry are listed in Table 5-2.

Table 5-2. RS-232-C/CCITT V.24 Interface Signal Levels

	Negative (More negative than -3V)	Positive (More positive than +3V)
Binary State	1	0
Signal Condition	Marking	Spacing
Function	OFF	ON

5-16. **SERIAL PORT.** The master microprocessor U6 handles all incoming serial data, converting it internally to the 8-bit parallel data used by the plotter circuitry, and converting all data from parallel to serial for transmission to the serial line.

5-17. REAR PANEL SWITCHES. The baud rate, parity and eavesdrop switches are read at power-up by the servo IC U13, and the data are passed to the master microprocessor through the slave microprocessor (U9).

5-18. EAVESDROP MODE. Eavesdrop operation is supported by the Multiplexer U2. When eavesdrop is selected by the rear panel switch S1F, the master microprocessor pulls the select SEL line low. This selects the signal inputs labeled "B" at U2, outputting Secondary Received Data at J1 pin 16 and Transmitted Data at J1 pin 14 to support the eavesdrop mode.

5-19. HP-IB INTERFACE (OPTIONAL)

5-20. An optional 8 bit parallel interface is available for the HP 7570. The optional plug-in cartridge provides the Hewlett-Packard implementation of the IEEE 488-1978 interface. The interface consists of an 8 bit parallel data bus with 3 handshake lines and 5 interface management lines. The handshake lines are identified as follows:

- a. DATA VALID (DAV) - Used to indicate that valid information is available on the data lines.
- b. NOT READY FOR DATA (NRFD) - Used to indicate the readiness of the Plotter to accept information.
- c. NOT DATA ACCEPTED (NDAC) - Used to indicate the acceptance of information by the Plotter.

5-21. The five interface management lines are used to provide an orderly flow of information across the interface bus. The lines are identified as follows:

- a. ATTENTION (ATN) - Used by the controller to specify how data on the DIO signal lines are to be interpreted, (command, data, or parallel poll response) and which devices on the bus must respond to the data.
- b. SERVICE REQUEST (SRQ) - Used to indicate that the plotter needs attention and to request an interruption of the current sequence of events.
- c. INTERFACE CLEAR (IFC) - Used by the controller to place the bus in a known quiescent condition.
- d. END OR IDENTIFY (EOI) - Used by a talker to indicate the end of a multiple byte transfer sequence or, in conjunction with ATN to execute a polling sequence.
- e. REMOTE ENABLE (REN) - Used to enable a remote control mode.

5-22. Positive true logic is used within the plotter circuitry. Therefore a positive false NRFD on the HP-IB bus will be converted to a positive true RFD within the plotter. The HP-IB functions implemented to the standard are listed in Table 5-3.

Table 5-3. HP-IB Functions

Name	Level
Acceptor Handshake	AH1
Source Handshake	SH1
Talker	T6
Listener	L3
Service Request	SR1
Device Clear	DC1
PARALLEL POLL	
Listen Only	PP0
Address 0-7	PP2
Address 8-30	PP1
NOT IMPLEMENTED	
Remote Local	RL0
Device Trigger	DT0
Controller	C0

5-23. The rear panel of the optional interface contains a 36 pin interface connector and a 6 segment slide switch. The first 5 segments of the switch are used to set the interface address of the plotter. The addresses are in the range 0 through 30 and Listen Only (31) mode.

5-24. At power up the plotter interface is determined by the first communication path opened with the master microprocessor. All communication with the optional cartridge is dependent upon the address line (A15) from the master microprocessor. The line must be high to communicate with the cartridge.

5-25. The address switch S1 is read via the bus driver U4 at power up when U4 is enabled by the low active SWTCH and read RD lines. The address is stored for comparison with external bus addresses.

5-26. BUS TRANSCEIVER. The HP-IB bus transceiver U10 is designed to handle all bus interface requirements in response to commands from the interface controller U3. When the HP-IB is not enabled, or the plotter is switched off, the bus lines will be at high impedance to prevent loading the bus lines.

5-27. INTERFACE CONTROLLER. The internal control of the HP-IB functions are handled by the Interface controller U3. The controller is enabled by the HP-IB signal from the 3 to 8 decoder U9. Interface control for the HP-IB is from the master microprocessor.

5-28. BUS COMMUNICATION. After the power up reset, the HP-IB signals NDAC and NRFD are set low, indicating a ready condition. The external controller will respond with a true ATN and an address on lines DIO1-DIO5. This address will be compared with the address stored in the plotter, and if valid, data transfer can take place. See Figure 5-2. The circled numbers indicate the timing sequence of the handshake.

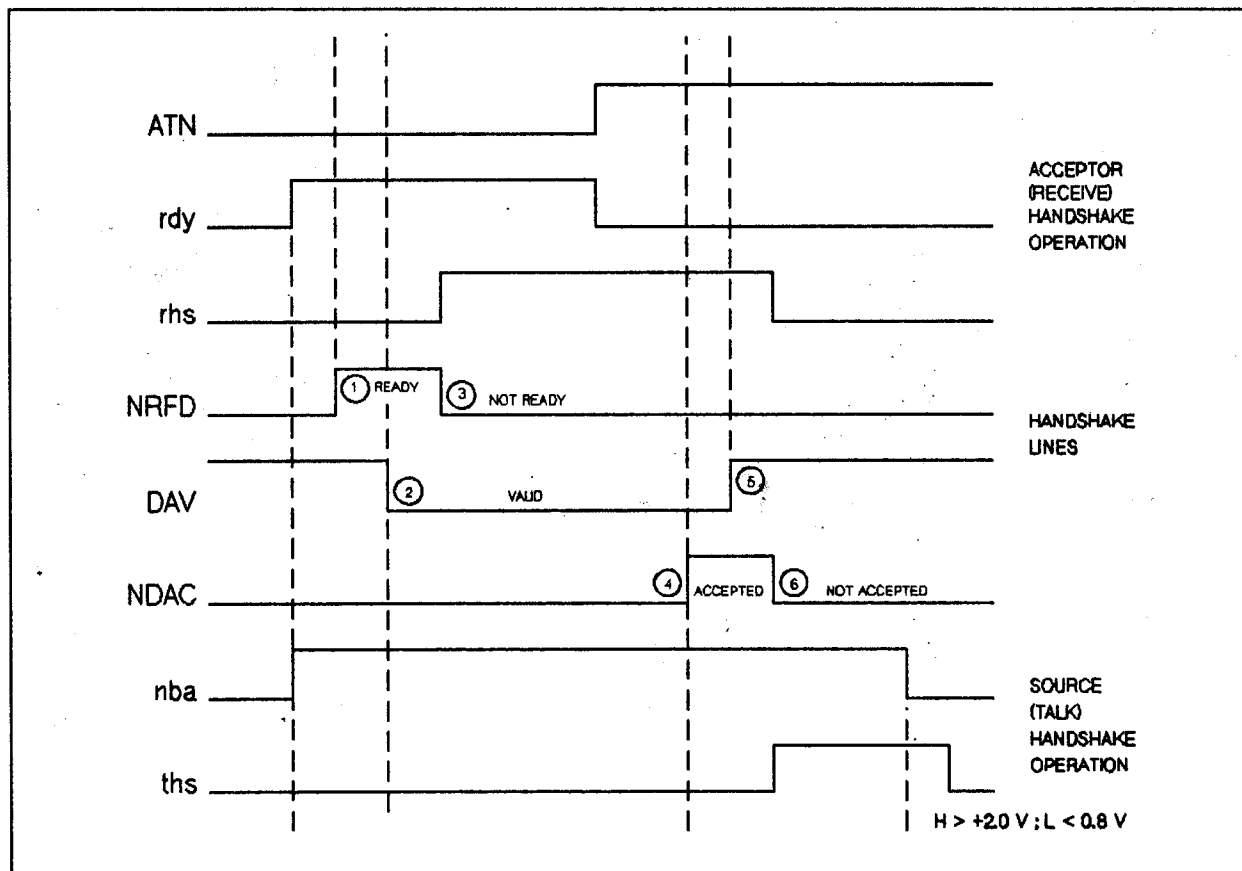


Figure 5-2. HP-IB Timing Diagram

5-29. MASTER MICROPROCESSOR

5-30. The master microprocessor U6 contains 256 bytes of internal RAM. The function of U6 is to control communication with the I/O ports, interpret interface and switch commands, handle character sets clipping, windowing, scaling, pen sort, and polygon buffer.

5-31. Master timing signals are generated by U6 from the 12MHz crystal at pins 18 and 19. The master microprocessor also generates control signals READ (RD), Write (WR), Address Latch Enable (ALE), and Program Store Enable PSEN.

5-32. Communication with the slave microprocessor is handled over the six bit nibble bus NB0-NB5, using four data bits and two handshake bits.

5-33. The master microprocessor has an internal serial communication port to directly handle the RS-232-C interface.

5-34. MEMORY CONTROL. The master microprocessor controls the 32K byte ROM (U14) and the 8K byte RAM (U10). Port 0 of the master microprocessor is multiplexed so that it may be used for the lower 8 bits of the address and for data. The address is latched by U7. Figure 5-3 illustrates the plotter memory map.

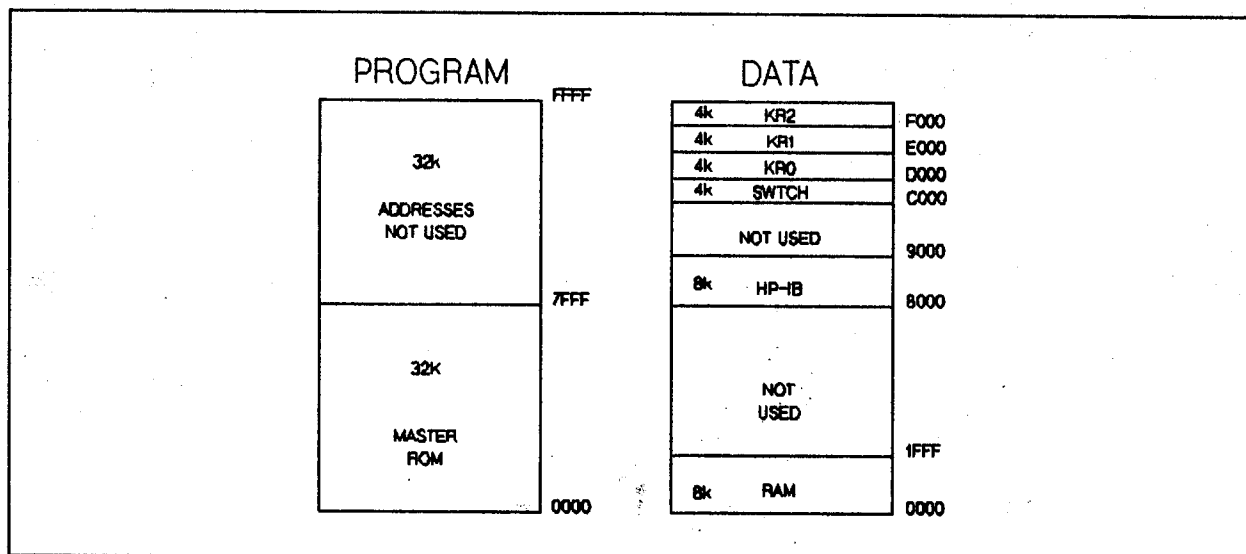


Figure 5-3. Memory Map

5-35. PROCESSOR CYCLES. The master microprocessor executes an external program cycle which runs at a 500 nanosecond rate. The timing diagram is illustrated in Figure 5-4. The external data read/write cycle which runs at a 1 microsecond rate is illustrated in Figure 5-5.

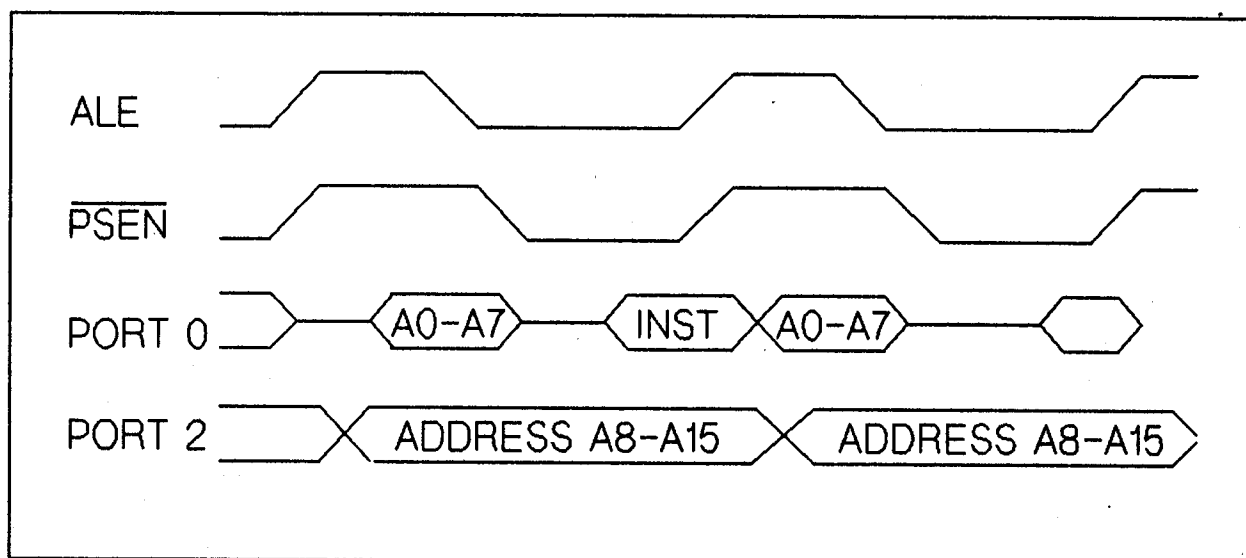


Figure 5-4. Program Read Timing

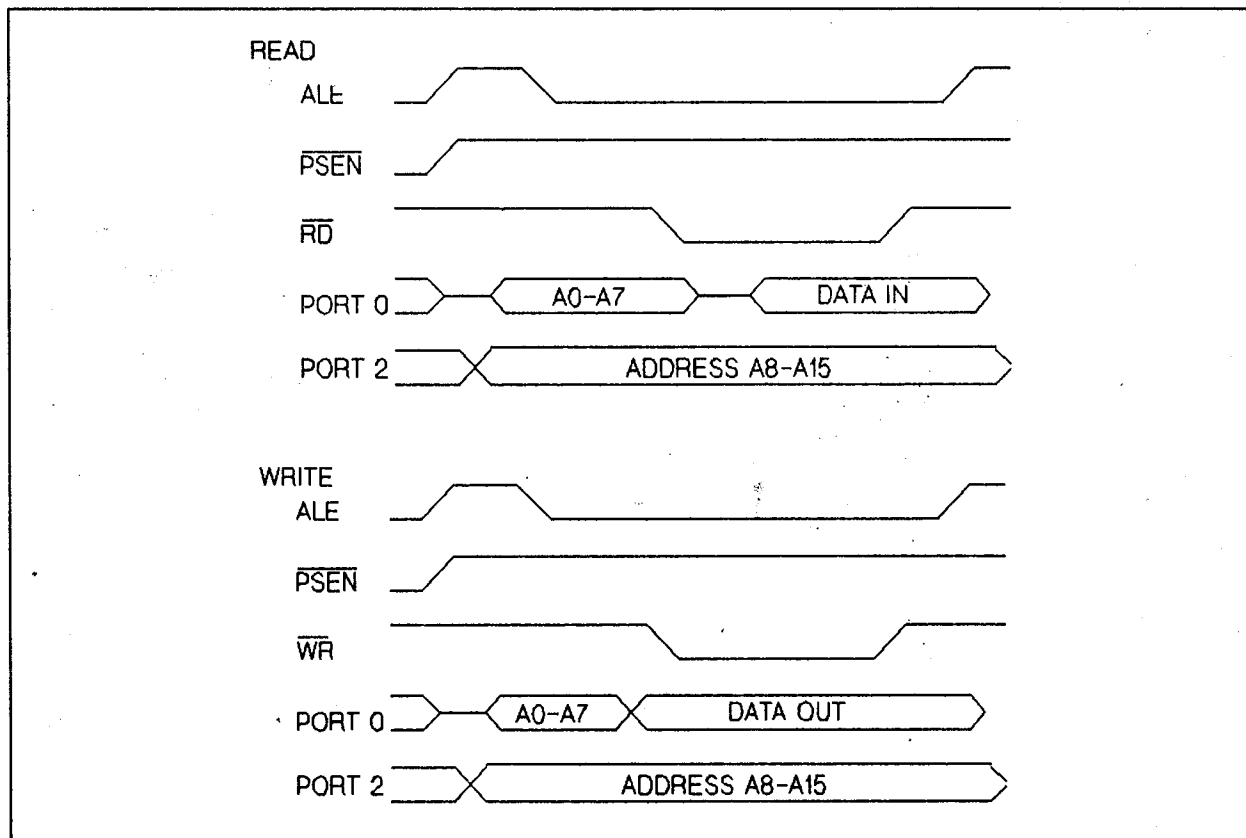


Figure 5-5. Data Read/Write Timing

5-36. SLAVE MICROPROCESSOR

5-37. The slave microprocessor (U9) contains 4 Kbytes of internal ROM and 128 bytes of internal RAM. The slave microprocessor functions as the servo controller handling reference generation over the servo address/data SAD0-SAD7 bus. The slave also handles front panel switch data, the front panel identity "OI" jumpers, shown in Figure 12-14, and some of the rear panel switches.

5-38. Motion control instructions are transmitted by the master microprocessor over the nibble bus to the slave processor. The slave microprocessor compares the new information with the data received over the SAD bus from the servo IC. The servo output data consists of position information derived from the up/down counters indicating the present paper and pen position. The slave microprocessor computes the required vectors and acceleration in response to these computations and transmits this data to the servo IC over the SAD bus. This data to the servo IC is updated every 500 microseconds. The major functions of the slave microprocessor ports are listed in Table 5-4.

Table 5-4. U9 Port Functions

Port	Function
0	Servo Address/Data Bus SAD0-SAD7
1	Nibble Bus NB0-NB5, Front Panel Jumpers
2	Front Panel Switch Matrix
3	Rear Panel Switch S1A-S1D, NSAFE, TM1, SRD, SWR

5-39. PORT 3 FUNCTIONS. Port 3 of the slave microprocessor handles some functions which require explanation.

5-40. The "Not Safe" NSAFE signal is an output from the slave in response to an error condition being detected in the servo output signals. The slave microprocessor stores data coming from the servo up/down counter and compares new incoming data with the stored data. If a discrepancy occurs between the expected data and the actual incoming data, the slave will assume that a problem exists and assert the NSAFE signal. The disable DISAB signal, derived from NSAFE at U8C, is used to shut down the motor drivers, U5, and the Eavesdrop multiplexer U2.

5-41. The TM1 signal is a timing signal from the +5V supply. This pulse width modulated signal allows the slave to monitor the duty cycle of the +5V and to correct the PWM output for variations in the +32 volt (VM) supply. The Servo Read (SRD) and Servo Write (SWR) signals control data flow on the SAD0-SAD7 bus.

5-42. MEMORY CIRCUITS

5-43. The memory on the main PCA A1 consists of 32K bytes of ROM U14, which contains the executable program instructions and data constants, and 8K bytes of RAM U10 which serves as temporary storage buffer. ROM occupies address locations 0000 to 7FFF, and RAM occupies 0000 through 1FFF.

5-44. Access to the main PCA memory is controlled by the address line (A15) which serves as a low active select line for the main PCA. When high, A15 selects the optional interface PCA, if installed.

5-45. Port 0 of the master microprocessor is multiplexed for data and the lower order address bits for the memory. The address bits are latched at the output of U7 by a low Address Latch Enable (ALE) so that the lines AD0-AD7 may be used for data transmission to and from the memory. ROM is accessed by a low A15 and the output is enabled by a low Program Store Enable (PSEN). RAM access is by a low A15 to enable the IC while a low Read (RD) enables the output, or a low write WR enables the input. The RAM timing is illustrated in Figure 5-6.

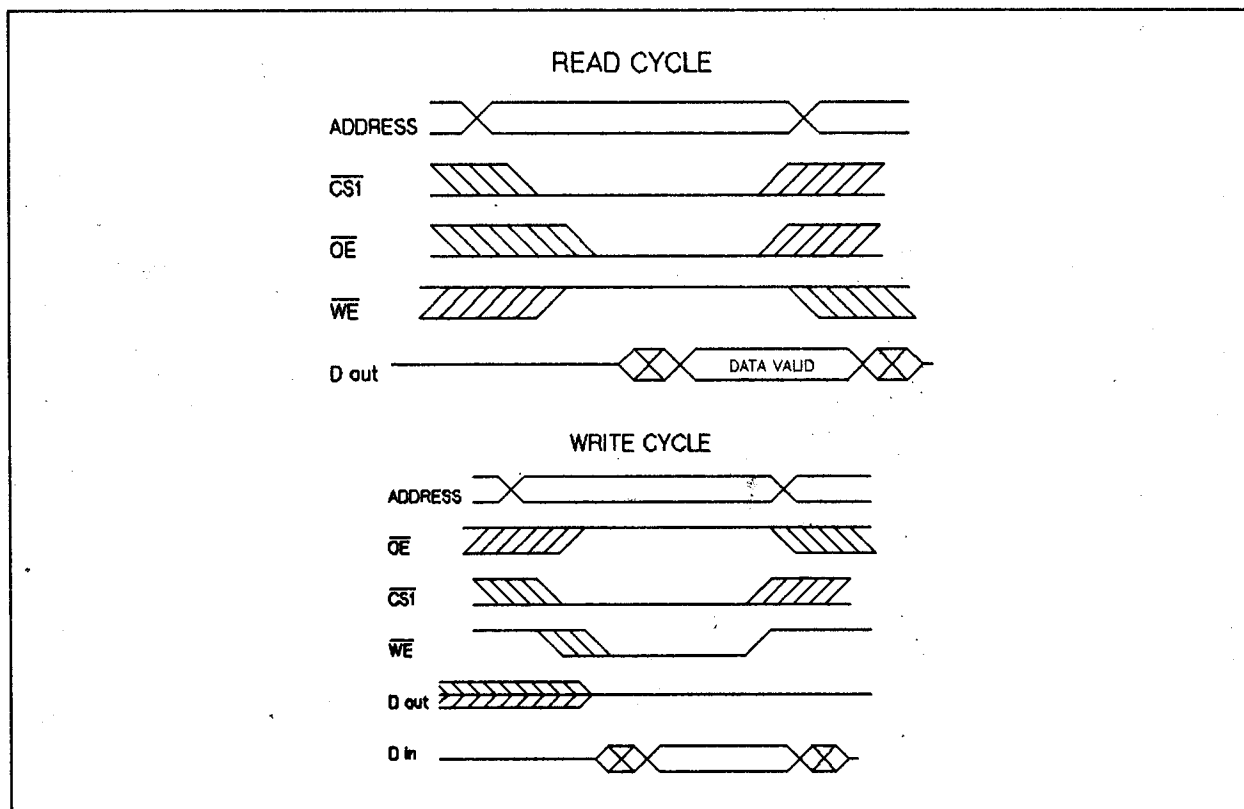


Figure 5-6. Read/Write Timing

5-46. The RAM contains three dynamic buffers whose sizes may be user defined. Maximum size of the three buffers combined is 7448 bytes. Default sizes and ranges are listed in Table 5-5.

Table 5-5. Buffer Sizes

Name	Default Size -bytes-	Range -bytes-
I/O	1024	1-7436
Polygon	1024	0-7435
Pen Sort	5400	12-7447

5-47. **OPTIONAL ROM CIRCUITS (KANJI).** If the optional interface cartridge with the Kanji character set is installed, an additional 192 Kbytes of ROM are included. The memory is configured as 16 pages containing 12 Kbytes each, with the paging configured across the ROMs.

5-48. Access to the optional memory is enabled by the high address line (A15) to the cartridge. Access to the 16 pages of memory is accomplished by latching the lower 4 address lines AD0-AD3 into U8 using SWTCH and WR to create the KRA0-KRA3 addresses. These form the high order address lines to the ROMs to select 1 of the 16 pages. The individual ROM is then selected by decoding the address lines A12-A14 at U9 from the ROM enable lines KR0-KR2. After the address is valid, the master microprocessor on the main PCA will pull RD low, putting the selected character set data on the AD0-AD7 bus. When RD goes high the master microprocessor will read the data from the bus.

5-49. SERVO IC CIRCUITRY

5-50. The servo IC U13 serves as an interface for the dc motors and the optical encoded servo feedback system. Contained within the servo IC are multiplexers and demultiplexers for the servo address/data SAD bus, decoder circuits for the optical encoders on each axis, pulse width modulator circuits for each motor axis and for the pen solenoid, motor protection circuits, 128 bytes of RAM, registers for the rear panel switches, and drivers for the front panel LEDs.

5-51. **SERVO OPERATION.** The master microprocessor derives coordinate data from the commands it receives through the external interface and transmits this data over the nibble bus NB0-NB5 to the slave microprocessor. The slave profiles the vector and status information. The data is then transmitted to the servo IC over the multiplexed servo address/data SAD0-SAD7 bus where the pulse width modulated signals are derived for each motor. The signal is generated by an 8 bit up/down counter providing a programmable, bi-directional duty cycle with a fixed repetition rate of 23.6 KHz. The motor data signals include built-in compensation for variations in the motor supply voltage VM, eliminating the need for power supply regulation. The servo IC pen solenoid drive circuit is a 5 bit down counter (U2) providing a programmable duty cycle. No directional data is required for the pen solenoid.

5-52. **ENCODER.** On each motor shaft is a 500-line optical disc which is read by an LED and sensor module mounted on the motor. The quadrature output is read by the servo IC at a 2 kHz rate. The phase relationship of the signals is detected to determine the direction of motor rotation. The output of the encoder controls the servo IC position counter which is a modulo 256 up/down counter. Motor protection is built into the servo IC. The circuitry will disable the motor drive output of the IC if no encoder read occurs for an extended period of time. A power up is required to reset the circuits from this condition.

5-53. MOTOR DRIVE CIRCUITS

5-54. The motor driver circuitry consists of four half bridge drivers with a motor connected at the tie point between two of the half bridge circuits. Each half bridge is comprised of a source and a sink, only one of which may be in operation at one time. While a particular source is on, the opposite sink is on, creating a path for current flow thorough the motor. The motor may be reversed by turning on the opposite source and sink. See Figure 5-7.

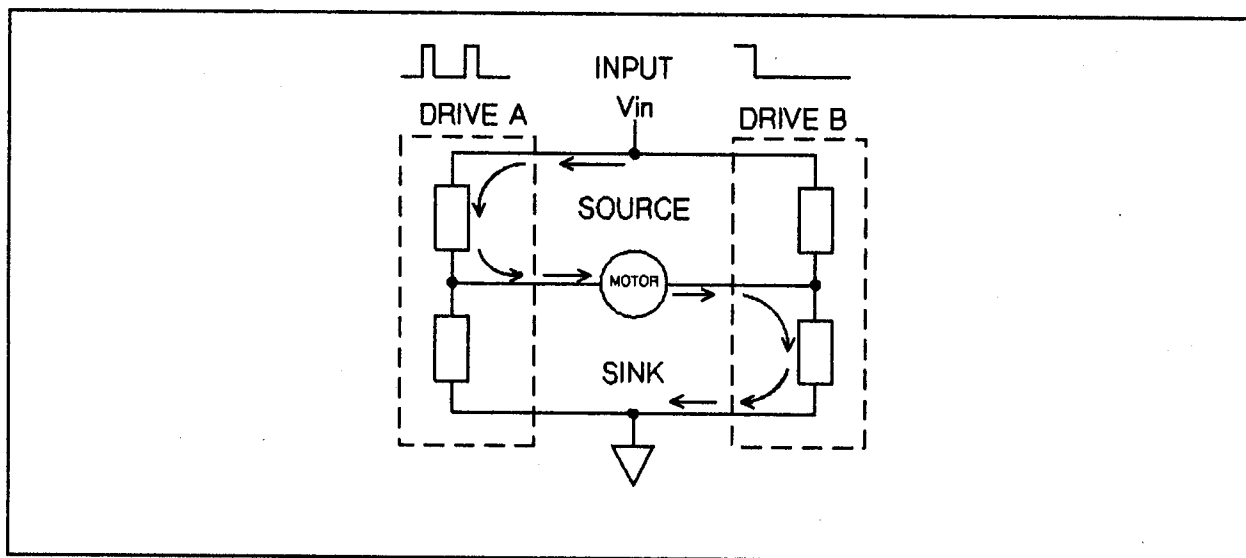


Figure 5-7. Motor Drive Circuit

5-55. Each source consists of a PNP and NPN transistor, with the PNP providing base current for the NPN. The diode across the emitter collector junction of the final drive transistors is configured to handle the flyback current when the motor direction is reversed. Each sink circuit is a MOSFET transistor which will provide a very low impedance path to ground when it conducts.

5-56. The Disable DISAB line at U4 of each driver protects the plotter mechanics in case of a circuit failure. When enabled, DISAB will turn off all the sink transistors, preventing any movement of the motors and mechanical parts. A power-up is then required to reset the circuit.

5-57. POWER SUPPLY

5-58. The power supply in the HP 7570 is a buck-configured switching supply. In this configuration the basic supply voltage VM is reduced or "bucked" to derive other lower voltages. The dc voltages in this supply are VM (approximately +32V), +5V, +12V, and -12V. A block diagram of the supply is shown in Figure 5-8.

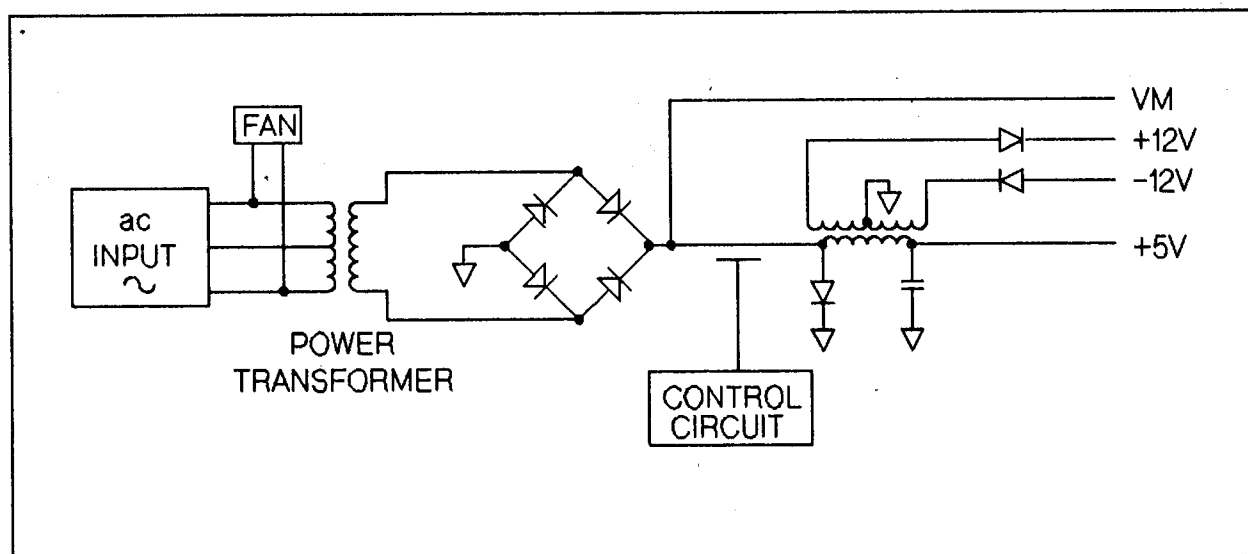


Figure 5-8. Power Supply Block Diagram

5-59. The basic supply voltage, VM (motor voltage), is nominally rated at +32V but may range from 20 to 39 V in normal operation.. It is derived from the output of the secondary of the power transformer, which is rectified by the full wave bridge CR2-CR5, and then filtered. The VM supply is not regulated. It is used as the source for the other dc voltages, Vcc for U12, and as the motor drive voltage.

5-60. The +5V supply is a switching supply, controlled by the pulse width modulation control IC, U12. The +5V supply is used as Vcc for the digital ICs.

5-61. The two 12 volt supplies are generated from the secondary of the transformer T1 during flyback. These supplies are indirectly controlled by the +5 volt level, and do not require closer regulation. In normal operation they may range from 11 to 14 volts.

5-62. PRIMARY CIRCUITS. The primary of the power supply will operate on any one of four nominal line voltages. The operating voltage is chosen by installing the voltage selector in one of four positions in the power module. The selector closes various switches in the module based upon the line

voltage, applying the line voltage to selected segments of the power transformer primary. The output voltage from the module also supplies 120 Vac to the vacuum fan. Contained in the power module are the ac receptacle, line fuse, and the power ON(I)/OFF(O) switch.

5-63. MOTOR VOLTAGE CIRCUIT. The secondary of the power transformer provides approximately 27 Vac to the printed circuit assembly. The zener diodes VR1 and VR2 and the triac Q1, provide protection for the circuits. The triac will fire at approximately 46 volts, which will short the secondary of the transformer and open the line fuse.

5-64. The full wave bridge rectifier CR2-CR5 and the filter capacitors provide the motor voltage VM, which is also used as the source for the other voltages.

5-65. 5 VOLT SUPPLY. The +5 volts is derived from VM by the buck configured switching supply. The transistor Q10 forms the switch, which is controlled by the pulse-width modulation (PWM) control IC, U12. The PWM IC compares the +5 volt supply with a reference voltage (VREF) and adjusts the output pulse width controlling the ON time of Q10 to control the +5 volt level. The ON time, or duty cycle, of Q10 is a function of the output voltage (+5) to input voltage (VM) ratio.

5-66. The VREF voltage is a 1% tolerance 5 volt low current source generated within U12. VREF is fed back to U12 pin 2 through the compensation network R46 and R51, which limits gain above certain frequencies. The VREF level is compared with the +5 volt supply being fed back to U12 at pin 1. The output of the error comparator is compared with an internal sawtooth waveform. The sawtooth is generated by the resistor and capacitor at pins 5 and 6 of U12. The output of U12 at pin 8 will be turned on during any period when the sawtooth exceeds the level of the error signal barring high signals on DDTM or pin 16.. See Figure 5-9.

NOTE

The Figure 5-9 is not to scale. The normal duty cycle is approximately 14 %.

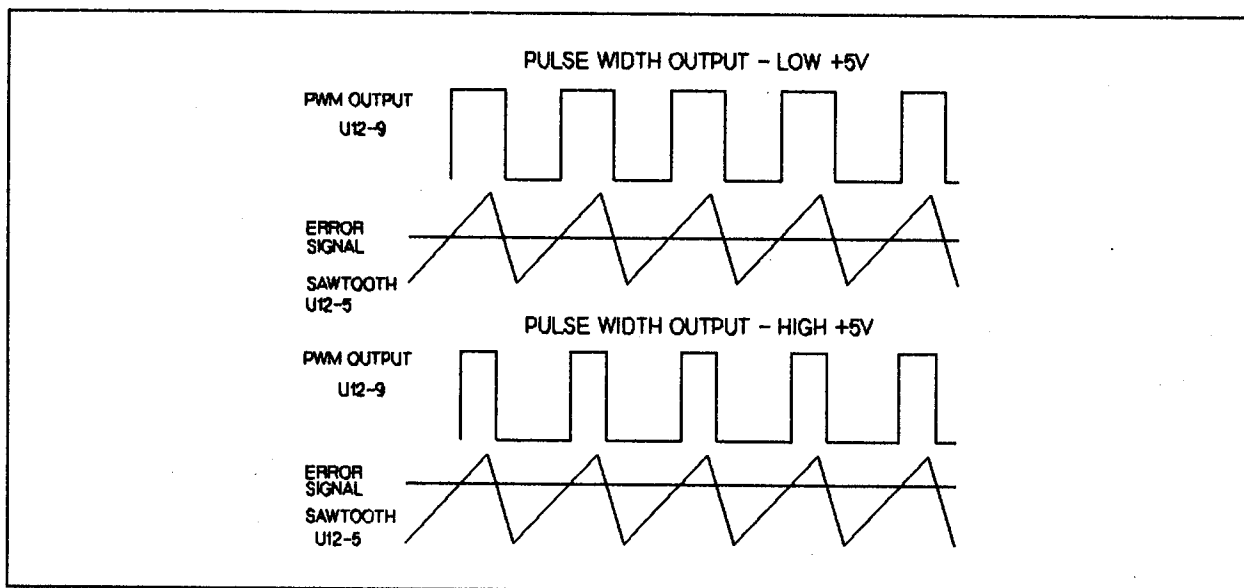


Figure 5-9. PWM Control Output

5-67. The circuitry in U12 at pin 8 is configured as an emitter follower transistor, which when turned on provides a current source for Q21. The Q21/Q11 circuitry controls the switch Q10. When Q10 is conducting, the current flow through the primary of T1 generates the +5 volts. The duty cycle of Q10 regulates the +5 volt supply.

5-68. Feedback from the 5 volt supply is provided by the output of U8D to the slave microprocessor. The signal TM1 (timer 1) is high during the ON time of Q10. The processor will count when this signal is high, and read this count at each interrupt. The count read is a function of the Vin voltage level, allowing the processor to compensate for variations in the +5 volt supply.

5-69. 12 VOLT SUPPLIES. The twelve volt supplies are generated during the flyback time of T1. When Q10 is turned on, the catch diode CR7 is reverse biased and current flows through the primary of T1. At this time pin 1 will be positive with respect to pin 5. Polarity in the secondary will reverse bias both CR12 and CR13. When Q10 is turned off, the polarities in the windings will reverse causing diodes CR7, CR12, and CR13 to conduct. With a controlled voltage across the primary of T1, +5V at pin 5 and -0.8V at pin 1 caused by the forward voltage of CR7, the turns ratio of the transformer generates +12 volts at CR13 and -12 volts at CR12. These voltages may range from 11 to 14 volts.

6-1. INTRODUCTION

6-2. This chapter contains instructions for the disassembly and assembly of the HP 7570. Included are instructions for personal safety while working on the plotter as well as data required to prevent damage to the plotter.

6-3. SAFETY CONSIDERATIONS

WARNING

Always remove ac power before opening the plotter or removing any of the covers. If servicing requires that power be on while protective covers are removed, proceed only with extreme caution, being careful not to touch exposed areas. Failure to observe these precautions may result in severe injury.

The following procedures are for use only by qualified service personnel who are aware of the possible hazards involved.

CAUTION

Failure to follow the proper procedures may result in damage to the plotter. Assure that the instructions are understood before attempting any of the procedures.

6-4. ESD CONSIDERATIONS

6-5. Integrated circuits can be damaged by electrostatic discharge. The following procedures must be followed to prevent damage to the plotter circuits from electrostatic discharge.

- a. Do not wear clothing which is subject to static build-up, such as wool or synthetic materials.
- b. Do not handle integrated circuits in carpeted areas.
- c. Do not remove an IC from its conductive foam pad until you are ready to install it.
- d. Avoid touching IC leads. Handle them by the plastic case.
- e. Ground your body while disassembling and working on the plotter. Conductive wristbands (00970-67900) are available for this purpose.
- f. After removing the top cover of the plotter, attach a clip-lead between the PCA common and earth ground. Touch all tools to earth ground to remove static charges before using them on the plotter.

6-6. REQUIRED TOOLS

6-7. The tools required for the removal and replacement of parts on the HP 7570 are listed in Table 6-1. Tools listed are contained in the HP Tool Kit, P/N JTK-536.

Table 6-1. Tools Required

Pliers, needle nose
Screwdriver, Pozidriv #2
Screwdriver, Pozidriv #1
Screwdriver, common
Torx driver T 20W
Nut driver, 5/16 in.
Spring Tool, combination

6-8. DISASSEMBLY AND ASSEMBLY

6-9. The matrix of disassembly procedures for the HP 7570 is found in Table 6-2.

6-10. To remove any particular item, find the item in the list at the left of the table, follow that row across noting each column marked with an "X". The number at the top of each column references the chapter paragraph indicating the procedures which must be followed to remove the desired part.

Table 6-2. Disassembly Matrix

To Remove:	Perform Steps:	6-11	6-14	6-17	6-20	6-25	6-28	6-31	6-34	6-37	6-40	6-43	6-46	6-50	6-53	6-56	6-59	6-62	6-65	6-68	6-71	6-74	6-77
6-11. Chassis Cover		X																					
6-14. Center Cover		X	X																				
6-17. Front or Rear Platen		X	X	X																			
6-20. Front Panel		X			X																		
6-25. PCA		X				X																	
6-28. Drive Shaft Motor/Enc.		X			X		X																
6-31. Pen Motor/Encoder		X						X															
6-34. Pinch Wheel									X														
6-37. Pen Carousel Shield		X								X													
6-40. Carousel Mount		X								X	X												
6-43. Worm Gear and Lever		X								X	X	X											
6-46. Paper Sensor Arm		X	X							X			X										
6-50. Pinch Wheel Arm (right)		X		X										X									
6-53. Pinch Wheel Arm (left)		X	X	X									X		X								
6-56. Paper Alignment Arm		X	X	X									X		X	X							
6-59. Center Platen		X	X	X									X	X	X		X						
6-62. Drive Shaft Assy		X	X	X									X	X	X		X	X					
6-65. Main Belt		X	X																X				
6-68. Pen Solenoid		X	X																	X			
6-71. Pen Carriage Assy		X	X																X		X		
6-74. Fan & Xfmr Module		X	X	X									X	X	X		X					X	
6-77. Pinch Wheel Switch		X	X			X																	X

6-11. CHASSIS COVER REMOVAL AND REPLACEMENT

WARNING

Disconnect the ac line cord and the interface cable before performing any disassembly or maintenance on the plotter. Failure to do so may expose the service person to high voltage circuits and possibly personal injury.

NOTE

The following procedures apply to both the left- and right-hand chassis covers.

6-12. To remove the cover, proceed as follows:

- a. Turn OFF (0) the plotter and disconnect the ac line cord and the interface cable from the back of the right-hand chassis.
- b. Remove the two machine screws from the lower back edge of the chassis cover. See Figure 6-1.

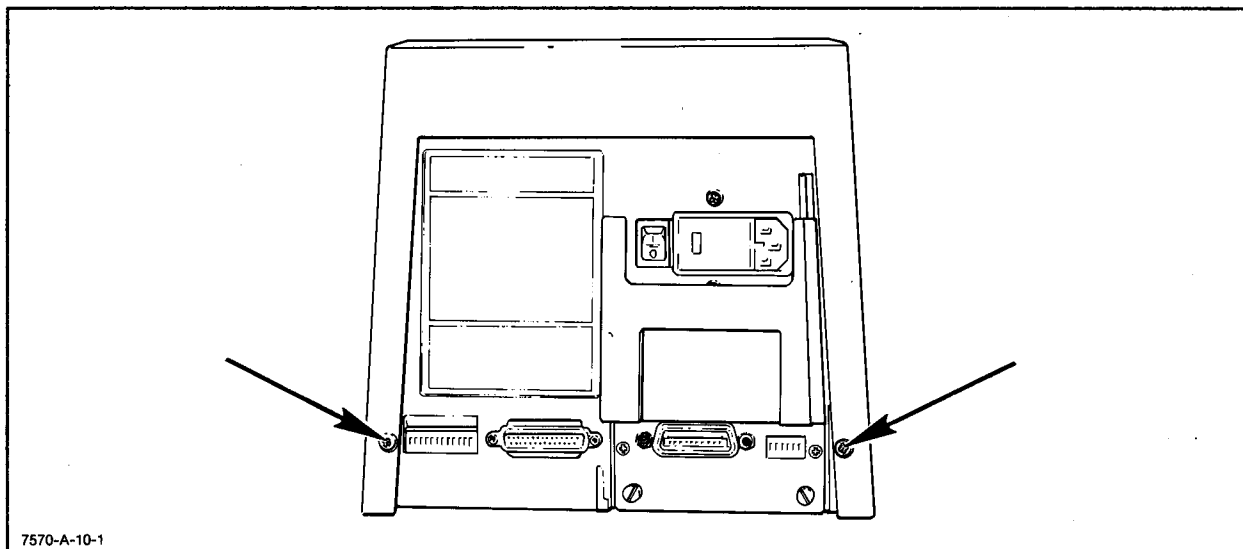


Figure 6-1. Chassis Cover Removal

- c. Press up firmly on the metal tab under the front edge of the cover, while pulling out and up on the lower front edge of the chassis cover. See Figure 6-2. Chassis Cover Latch.
- d. Lift up on the front and back edges of the cover, lifting it straight up from the plotter.

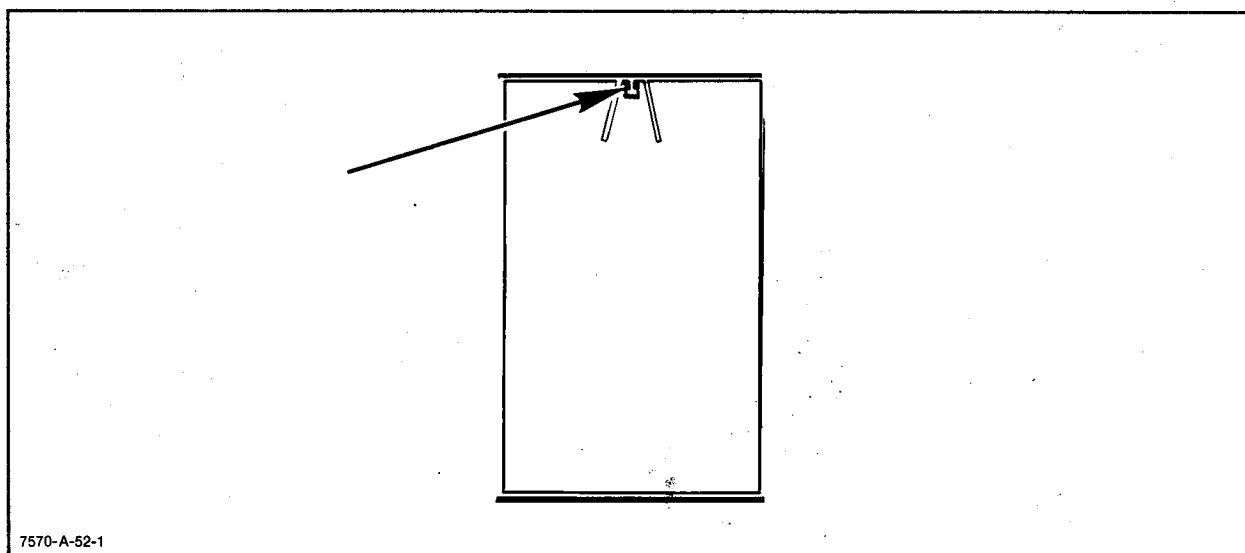


Figure 6-2. Chassis Cover Latch

6-13. To replace the cover, proceed as follows:

- a. Carefully lower the cover into position over the chassis assuring that the corners are outside of all the metal base.
- b. Press up on the metal tab, allowing the front tab of the cover to snap into the slot in the base.
- c. Install the two machine screws at the rear of the cover.

6-14. CENTER COVER REMOVAL

NOTE

To move the pen carriage assembly completely to the left, under the service opening, manually move the carriage to the pen down position when the first stop is encountered.

6-15. To remove the center cover, proceed as follows:

- a. Remove the left- and right-hand chassis covers. Refer to the procedures in this chapter.
- b. Manually move the pen carriage assembly under the service opening in the center cover.
- c. Unplug the pen solenoid cable from the trailing cable. See Figure 6-3.
- d. Carefully remove the trailing cable from the clip on the pen carriage.

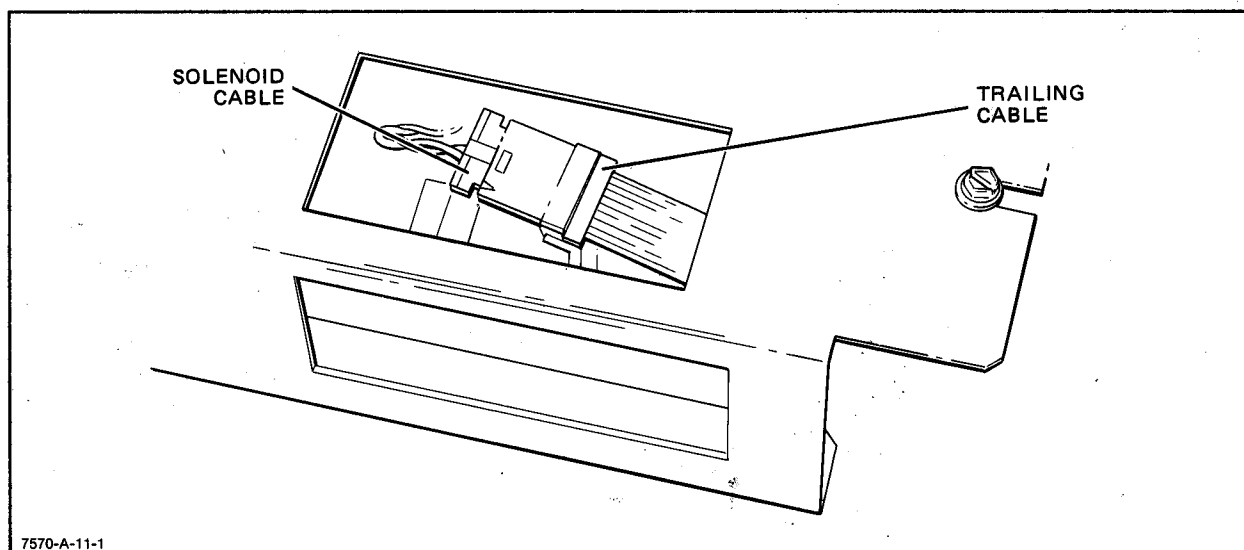


Figure 6-3. Solenoid Trailing Cable

- e. Unplug the trailing cable from the PCA. See Figure 6-4.

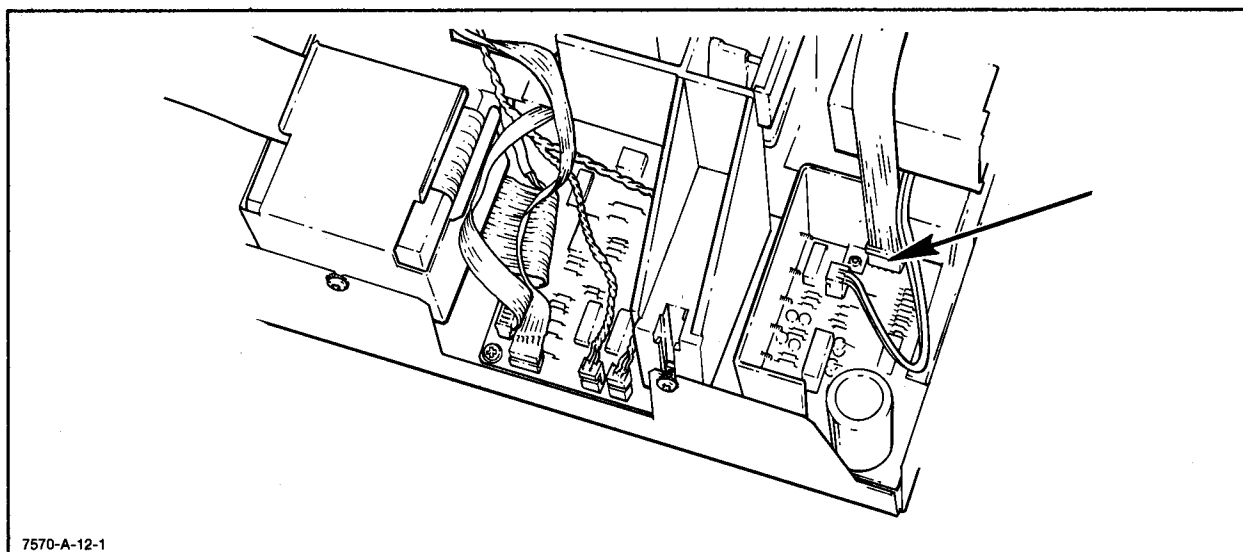


Figure 6-4. Trailing Cable Connection

- f. Remove the screws from each end of the center cover. See Figure 6-5.
- g. Carefully lift the center cover from the plotter, taking care to clear the trailing cable from the chassis.

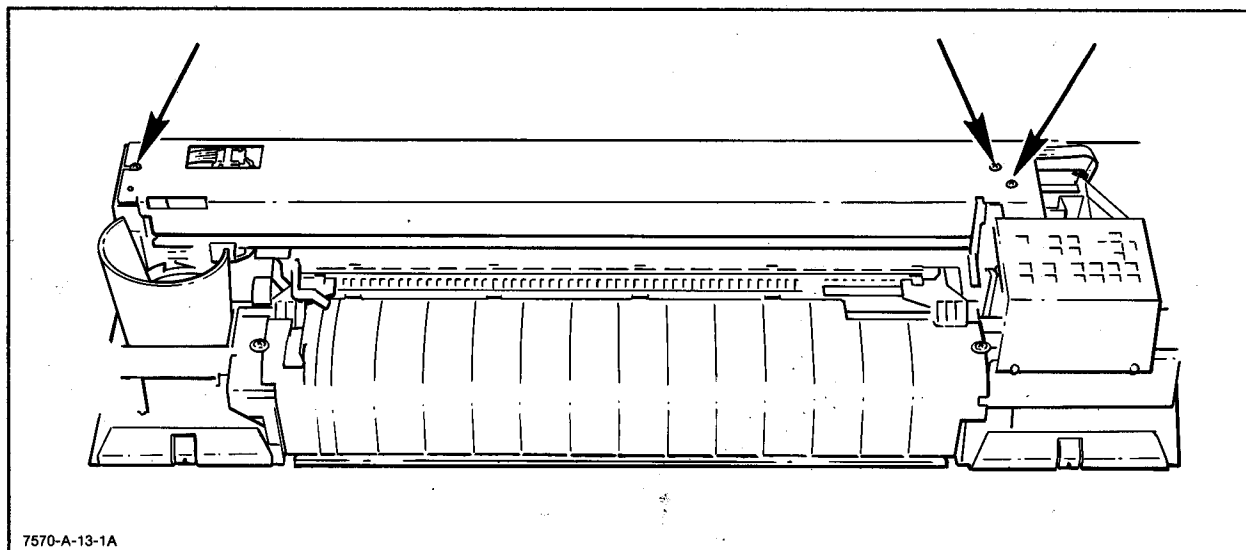


Figure 6-5. Center Cover Removal

NOTE

When replacing the center cover, assure that the trailing cable is properly installed in the clips under the cover.

6-16. To replace the center cover, proceed as follows:

- a. Carefully lower the center cover over the alignment pins.
- b. Route the trailing cable correctly and connect it to the PCA. See Figure 6-6. Trailing Cable Installation.

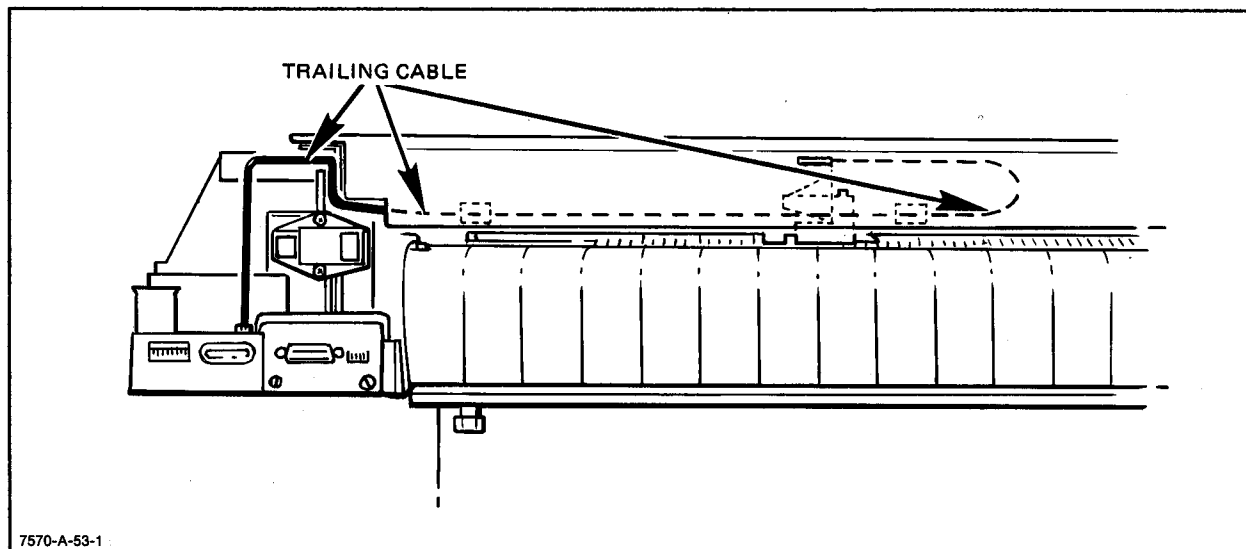


Figure 6-6. Trailing Cable Installation

- c. Connect the trailing cable to the pen lift solenoid and clip into place.
- d. Connect the trailing cable to the PCA.
- e. Manually move the pen carriage back and forth to check for cable interference or binding.
- f. Secure the center cover.
- g. Replace the chassis covers.

6-17. FRONT AND REAR PLATEN REMOVAL

CAUTION

Use extreme care not to bend the front or rear platens during removal or replacement. Any bending may interfere with paper movement and plotting.

NOTE

The following procedure applies to either the front or rear platen.

6-18. To remove the front or rear platen, proceed as follows:

- a. Remove the left-hand, center, and right-hand chassis covers.
- b. Remove the self-tapping screws securing the upper ends of the platen. See Figure 6-7.

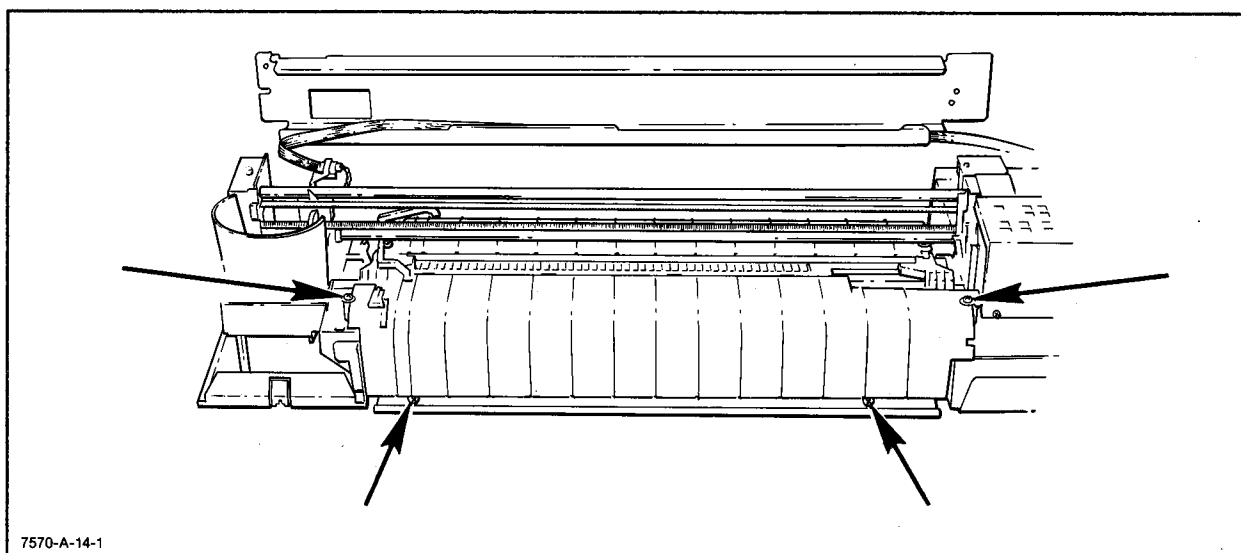


Figure 6-7. Platen Removal

- c. Loosen, but do not remove the two machine screws securing the platen to the plotter. See Figure 6-7.
- d. Carefully lift the outer edge of the platen and remove it from the plotter.

6-19. To install the front or rear platen, proceed as follows:

- a. Align the tabs on the platen edge with the slots on the center platen.
- b. Carefully lower the platen over the alignment pins at the ends of the plotter.
- c. Assure that the slots in the platen are correctly aligned with the two machine screws, lower the platen into position, and tighten the machine screws.
- d. Replace the two self-tapping screws.
- e. Replace the center cover.
- f. Replace the chassis covers.

6-20. FRONT PANEL REMOVAL

6-21. To remove the front panel assembly, proceed as follows:

- a. Remove the right-hand chassis cover.
- b. Remove the three screws in the center cover. See Figure 6-5.
- c. Remove two the machine screws from the front edge of the front panel assembly. See Figure 6-8.

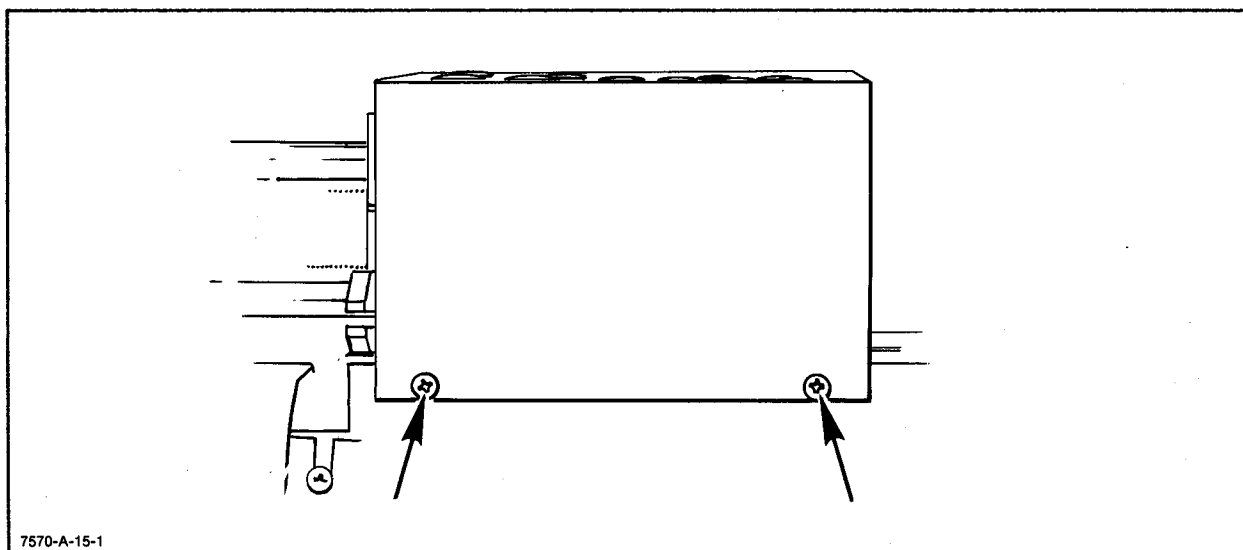


Figure 6-8. Front Panel Mounting

- d. Carefully disconnect the front panel cable assembly from under the front panel assembly. See Figure 6-9.

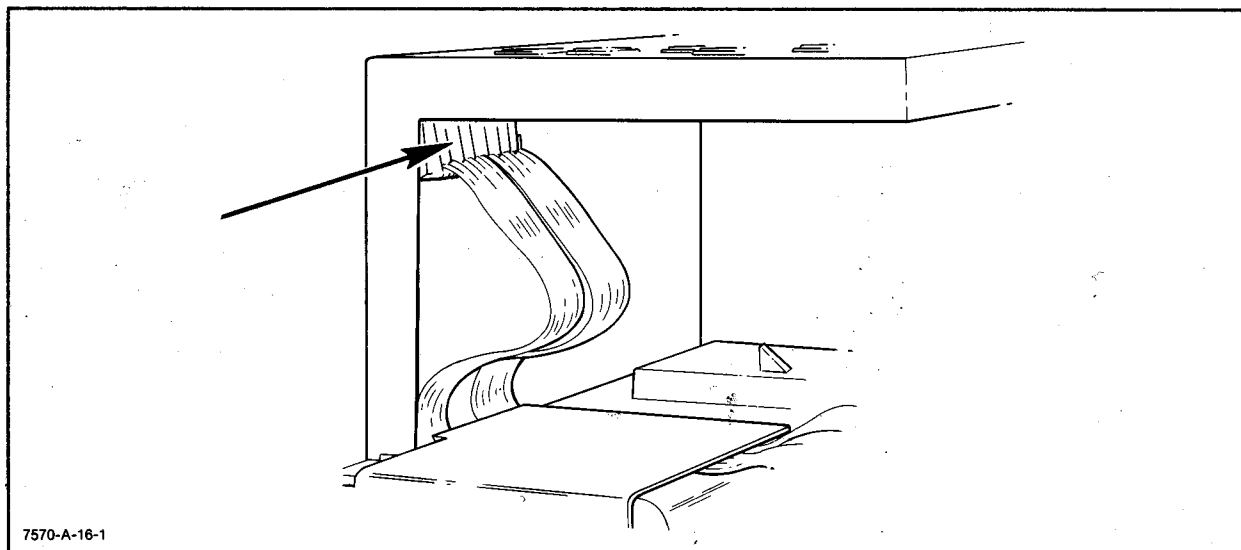


Figure 6-9. Front Panel Cable Connection

- e. Lift the rear edge of the panel assembly to disengage the mounting tab, and pull the panel assembly forward slipping the panel shield from under the center cover assembly.

6-22. To remove the front panel cable assembly:

- a. Loosen the screws in the shield. See Figure 6-10.
- b. Lift the shield from the plotter.
- c. Remove the cable assembly.

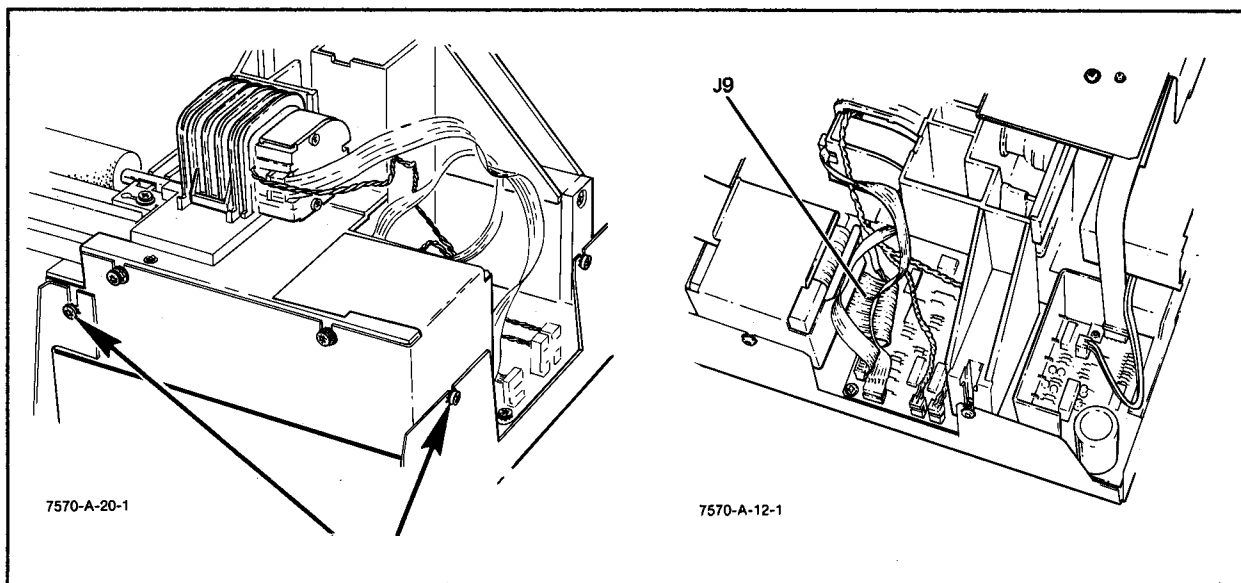


Figure 6-10. Front Panel Cable Removal

6-23. To replace the cable assembly:

- a. Route the front panel cable under the shield.
- b. Lower the shield in to position and tighten the two machine screws. See Figure 6-10.
- c. Connect the cable assembly to J9 on the Main PCA.

6-24. To replace the front panel assembly, proceed as follows:

- a. Slip the front panel shield under the center cover.
- b. Align the tab at the rear of the panel assembly with the notch in the chassis and lower into position.
- c. Connect the front panel cable assembly to the panel. Check pin alignment carefully.
- d. Replace the machine screws mounting front panel.
- e. Replace the three center cover screws.

6-25. PCA REMOVAL

6-26. To remove the PCA, proceed as follows:

NOTE

If the HP-IB optional interface module is installed, it must be removed before the rear panel is removed.

- a. Remove the right-hand chassis cover.
- b. Remove the two flathead machine screws securing the rear panel to the power module. Remove the panel. See Figure 6-11. Rear Panel Removal.

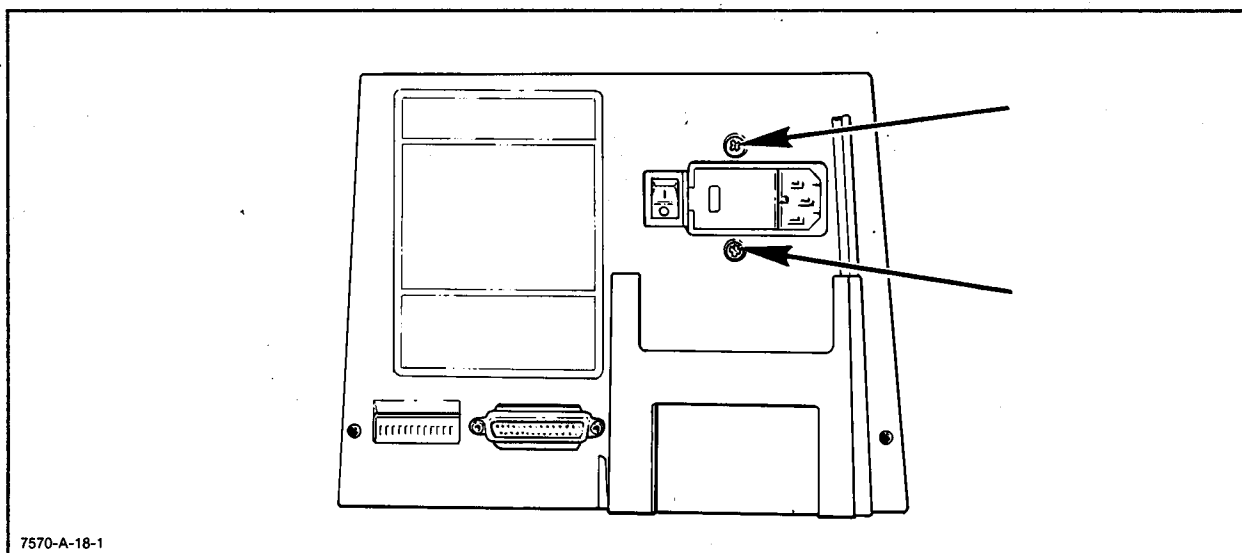


Figure 6-11. Rear Panel Removal

- c. Remove the five screws securing the right-hand shield between the pan and the right-hand base. See Figure 6-12. Right-Hand Shield Removal.

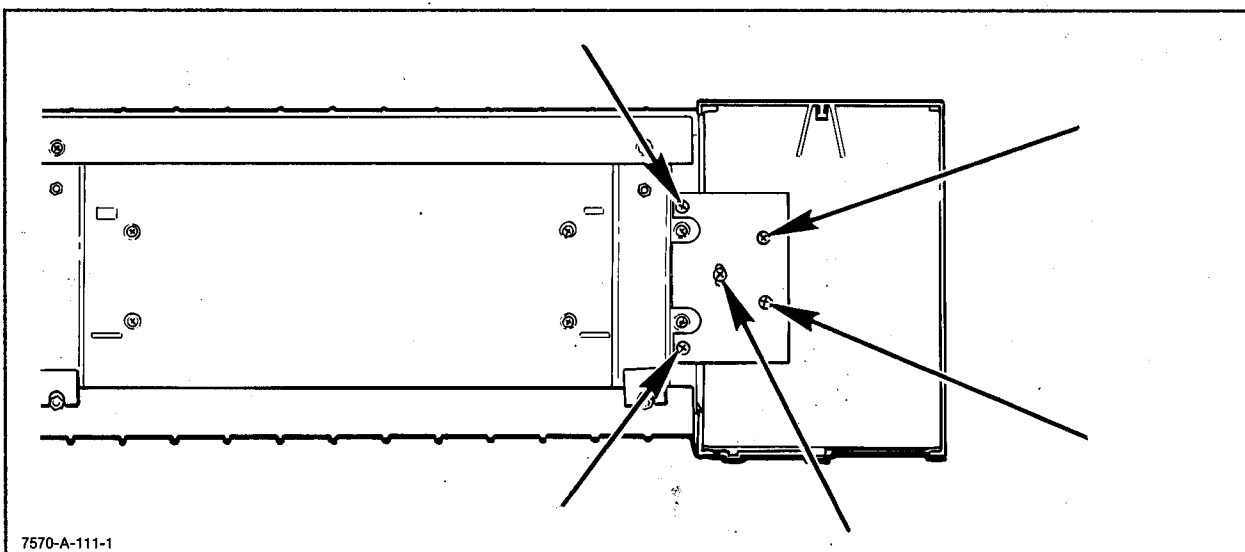


Figure 6-12. Right-Hand Shield Removal

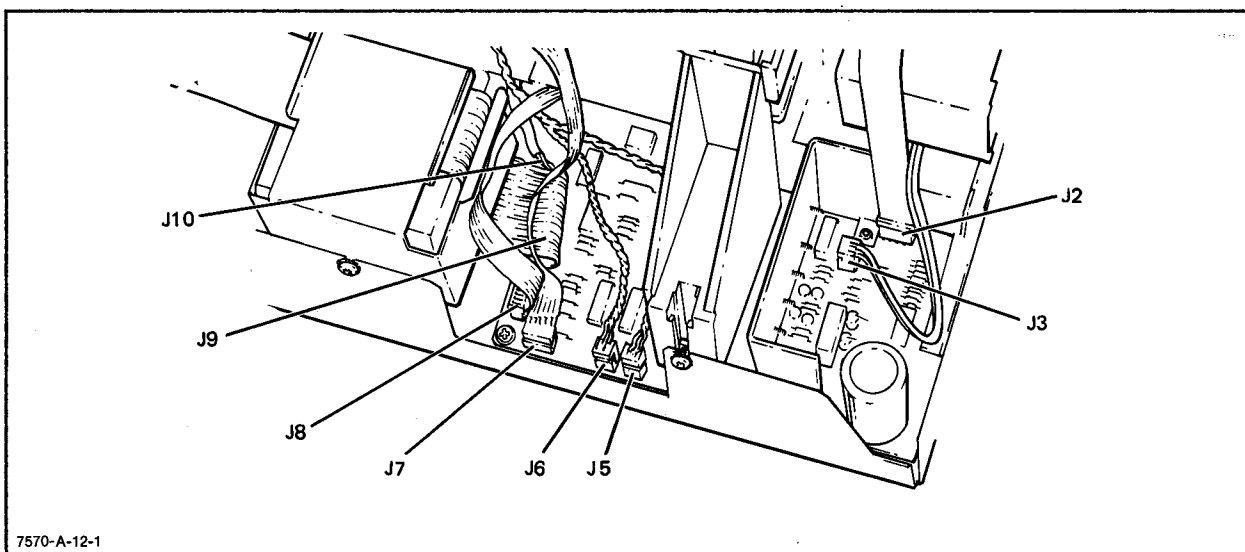


Figure 6-13. PCA Cable Connection

d. Disconnect all cables from the PCA. See Figure 6-13.

CAUTION

The following step will allow the base assembly and PCA to fall free of the plotter. Use care not to damage the base or PCA.

e. Loosen the four machine screws holding the base to the plotter. See Figure 6-14.

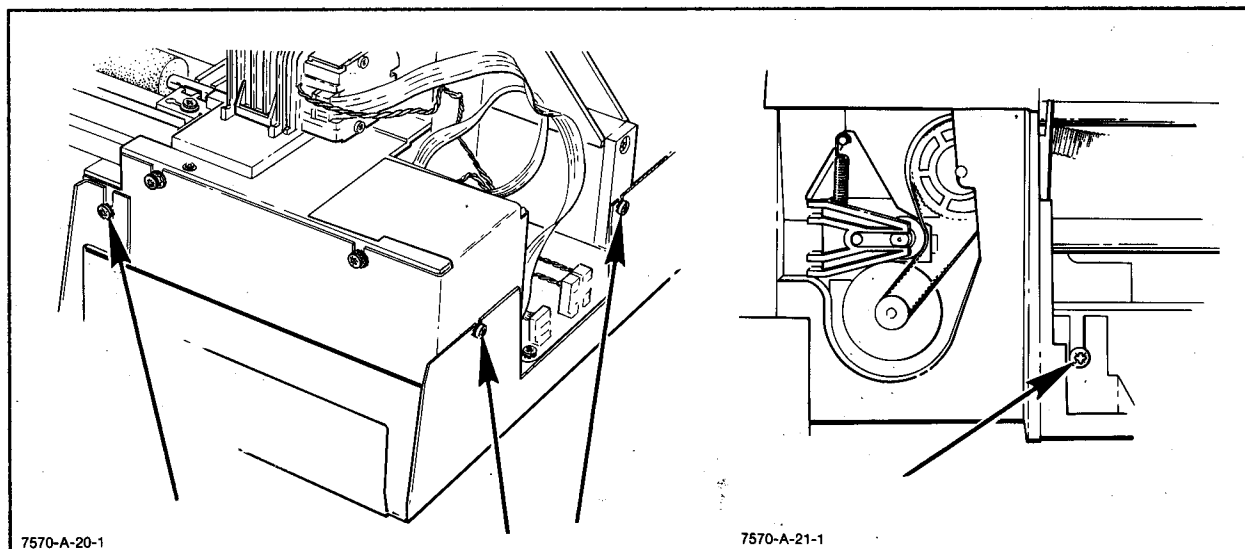


Figure 6-14. Right Base Removal

- f. Lower the base and PCA from the plotter.
- g. Remove the five machine screws securing the PCA to the base.
- h. Slide the PCA toward the rear of the base to clear the option module guide, and then lift the PCA out.

6-27. To replace the PCA, proceed as follows:

- a. Slide the PCA under the Option Module guide, align it with the standoffs and secure with the 5 machine screws.

CAUTION

Carefully position all of the cable assemblies so that none will be damaged while installing the base assembly.

- b. Properly align the base with the mounting screws and raise it into position.
- c. Tighten the four machine screws to secure the base.

NOTE

The jacks on the PCA marked PAPER MOT (J5) and PAPER ENC (J7) connect to the motor turning the drive shaft assembly. The jacks marked PEN MOT (J6) and PEN ENC (J8) connect to the motor driving the main belt and the pen carriage assembly.

When connecting the cables to the PCA, route the cables through the cable clips as they were before disassembly.

- d. Connect the cable assemblies to the PCA.
- e. Replace the rear panel.
- f. Replace the right-hand shield. See Figure 6-12.
- g. Replace the right-hand chassis cover.

6-28. DRIVE SHAFT MOTOR/ENCODER REMOVAL

6-29. To remove the drive shaft motor/encoder assembly, proceed as follows:

- a. Remove the right-hand chassis cover
- b. Remove the front panel assembly.
- c. Remove the drive tension spring with needle nose pliers or combination spring tool. See Figure 6-15.

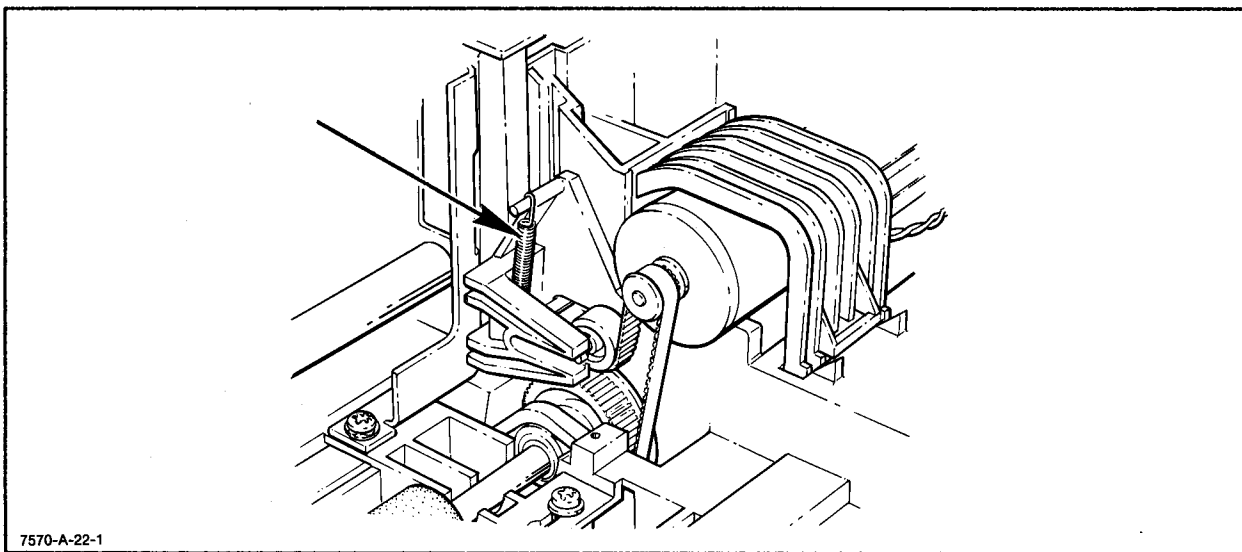


Figure 6-15. Drive Tension Spring

- d. Remove the drive belt from the motor drive gear.
- e. Disconnect the motor cable and encoder cable from the PCA, jacks J5 and J7. See Figure 6-13.

- f. Using a common screwdriver, press in and lift at the lower front edge of the motor clamp. See Figure 6-16.

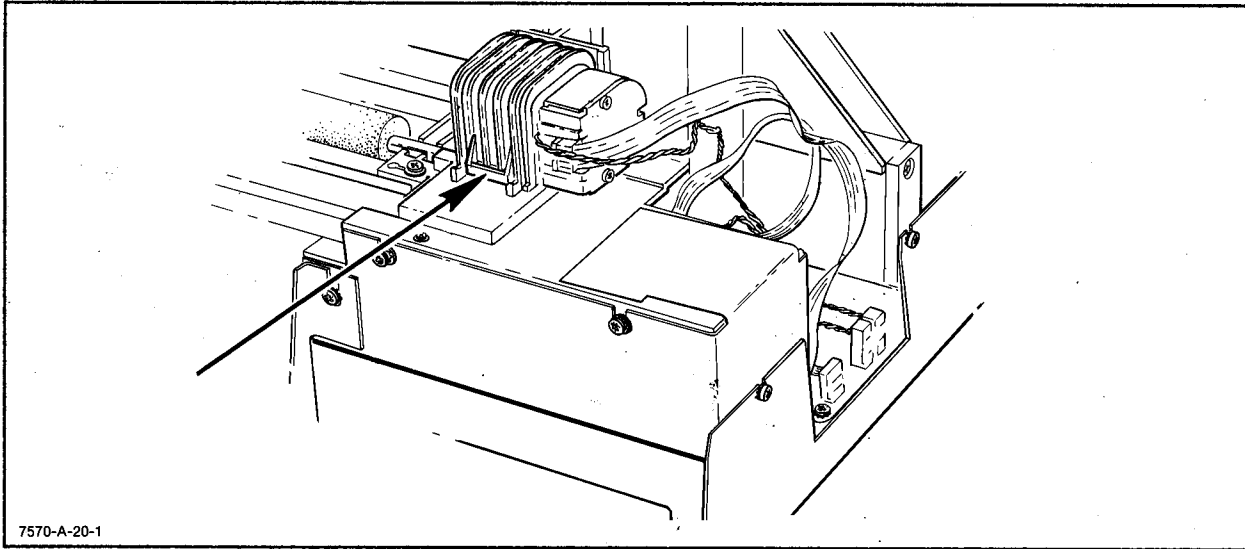


Figure 6-16. Drive Shaft Motor Clamp

- g. The motor/encoder assembly may now be removed from the plotter.

6-30. To install the drive shaft motor/encoder assembly, proceed as follows:

- a. Align the tab on the encoder housing with the slot in the chassis. Seat the motor/encoder.
- b. Replace the motor clamp, first inserting the hooks on the upper end of the clamp into the slots in the chassis, then pressing down and in, seat the lower clamp tabs in the chassis slots. The clamp will snap into place when seated correctly.
- c. Connect the motor and encoder cables to the PCA, jacks J5 and J7.
- d. Place the drive belt around the motor gear, checking the drive tensioner pulley alignment.
- e. Replace the tension spring.
- f. Replace the front panel assembly.
- g. Replace the right-hand chassis cover.

6-31. PEN CARRIAGE MOTOR/ENCODER REMOVAL

6-32. To remove the pen carriage motor encoder assembly, proceed as follows:

- a. Remove the right-hand chassis cover.

NOTE

If the HP-IB optional interface module is installed, it must be removed before the rear panel is removed.

- b. Remove the rear panel. See Figure 6-11.
- c. Remove the base and PCA.
- d. Remove the drive belt tension spring. See Figure 6-17.

NOTE

If necessary refer to procedures in this chapter and remove the power module and primary shield to gain access to the drive belt.

- e. Remove the drive belt from around the motor gear.

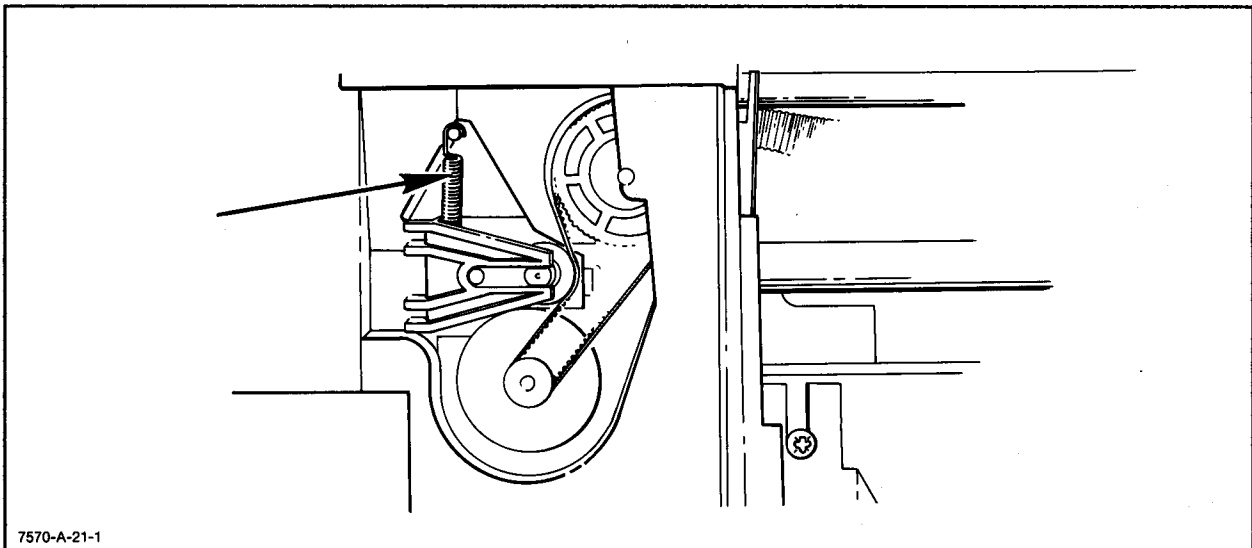


Figure 6-17. Pen Carriage Drive Belt Tensioner

CAUTION

The next step will release the motor/encoder assembly from the plotter. Use care not to let the assembly fall as serious damage may result to the encoder.

- f. Using a common screwdriver, press in and down at the top edge of the motor clamp releasing it from the chassis.

6-33. To install the pen carriage motor/encoder assembly, proceed as follows.

- a. Carefully align the tab on the encoder housing with the slot in the chassis. Seat the motor.
- b. Install the motor clamp by first inserting the hooks at the rear of the clamp and then pressing up and in at the front edge of the clamp. The clamp will snap into position when properly seated.
- c. Install the base and PCA. Connect all cable assemblies. See Figure 6-13.
- d. Slip the drive belt around the motor gear, checking the drive tensioner pulley alignment.
- e. Replace the drive tension spring.
- f. Replace the rear panel.
- g. Replace the right-hand chassis cover.

6-34. PINCH WHEEL REMOVAL

6-35. To remove a pinch wheel, proceed as follows:

- a. Raise the pinch wheels by means of the lever at the left end of the platen.
- b. Press on the end of the small shaft protruding from the outer end of each pinch wheel arm. See Figure 6-18.
- c. The shaft may be pulled from the arm, releasing the pinch wheel.

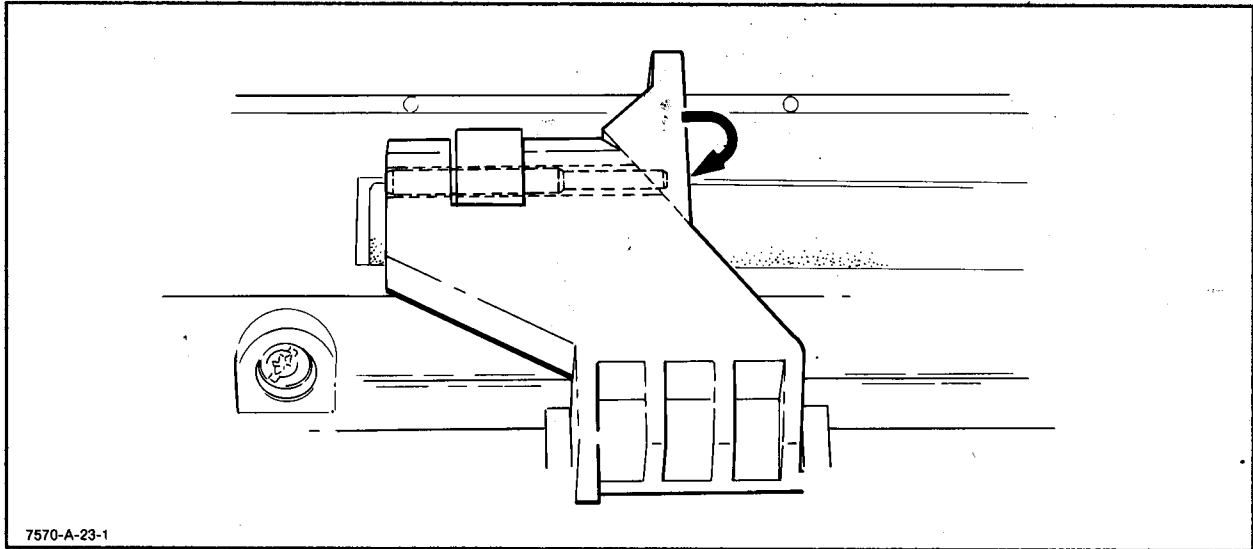


Figure 6-18. Pinch Wheel Removal

6-36. To install the pinch wheel, proceed as follows:

- a. Position the wheel in the arm.
- b. Insert the shaft on the inner end of the arm, and press in until the shaft is fully seated.

6-37. PEN CAROUSEL SHIELD REMOVAL

6-38. To remove the pen carousel shield, proceed as follows:

- a. Remove the pen carousel.
- b. Remove the left-hand chassis cover.
- c. Remove the self-tapping screw securing the shield. See Figure 6-19.

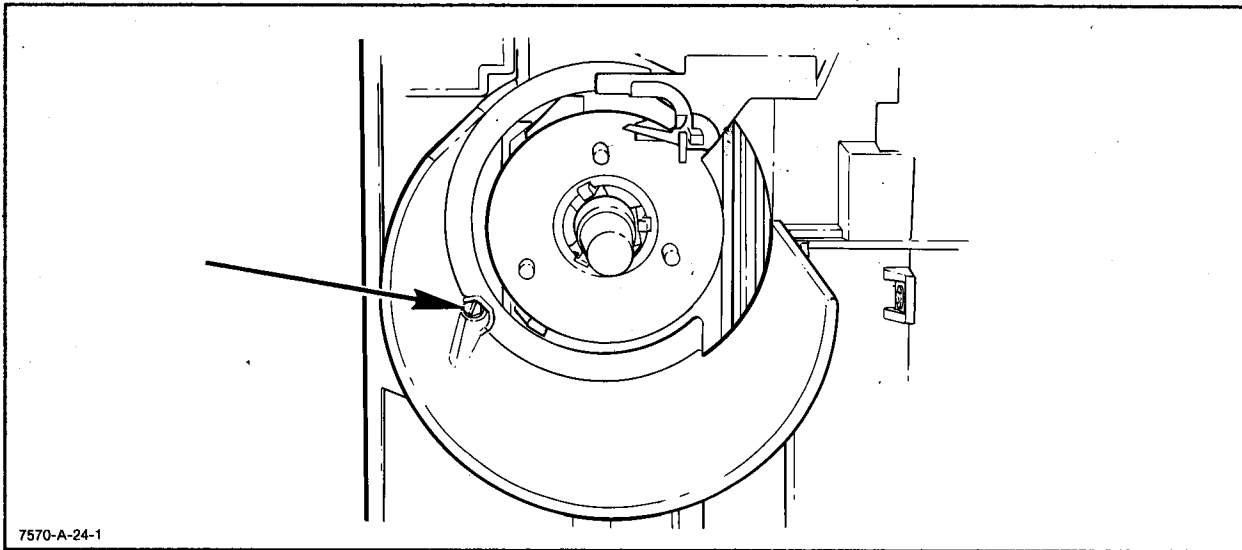


Figure 6-19. Pen Carousel Shield Removal

- d. Lift the shield from the plotter.

6-39. To replace the pen carousel shield, proceed as follows:

- a. Position the shield over the carousel mount assuring that the rear edge is under the locating tab.
- b. Secure the shield with a self-tapping screw.
- c. Replace the left-hand chassis cover.
- d. Install the carousel.

6-40. CAROUSEL MOUNT REMOVAL

6-41. To remove the carousel mount, proceed as follows:

- a. Remove the pen carousel.
- b. Remove the left-hand chassis cover.
- c. Remove the carousel shield.
- d. Using a common screwdriver, carefully press in on the tabs on the carousel mount and lift off the carousel turntable. See Figure 6-20.

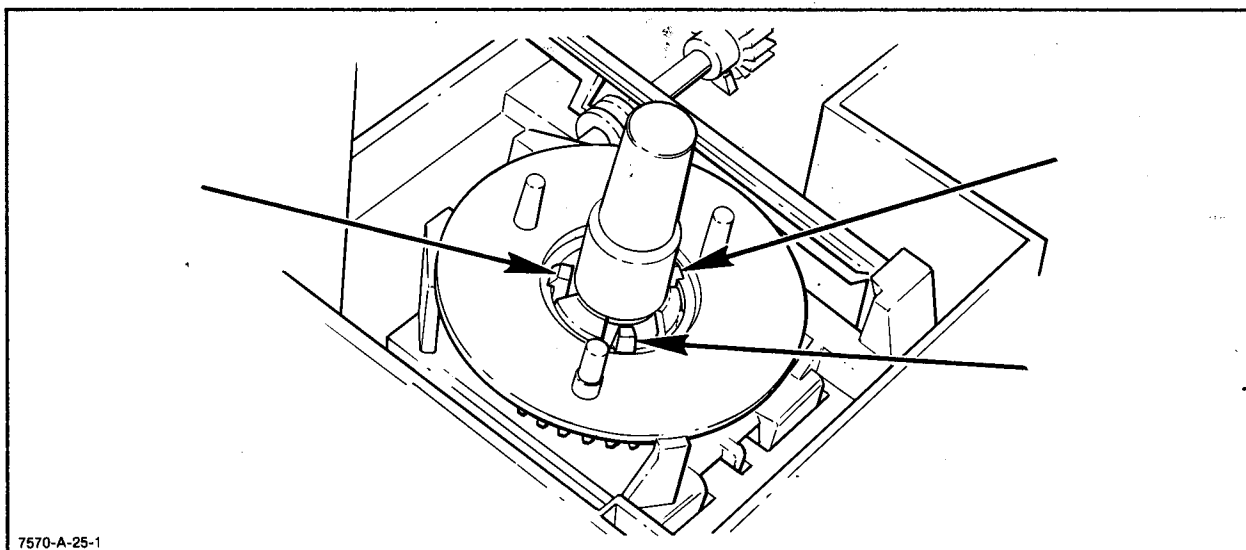


Figure 6-20. Carousel Turntable

- e. Remove the engaging lever spring. See Figure 6-21.

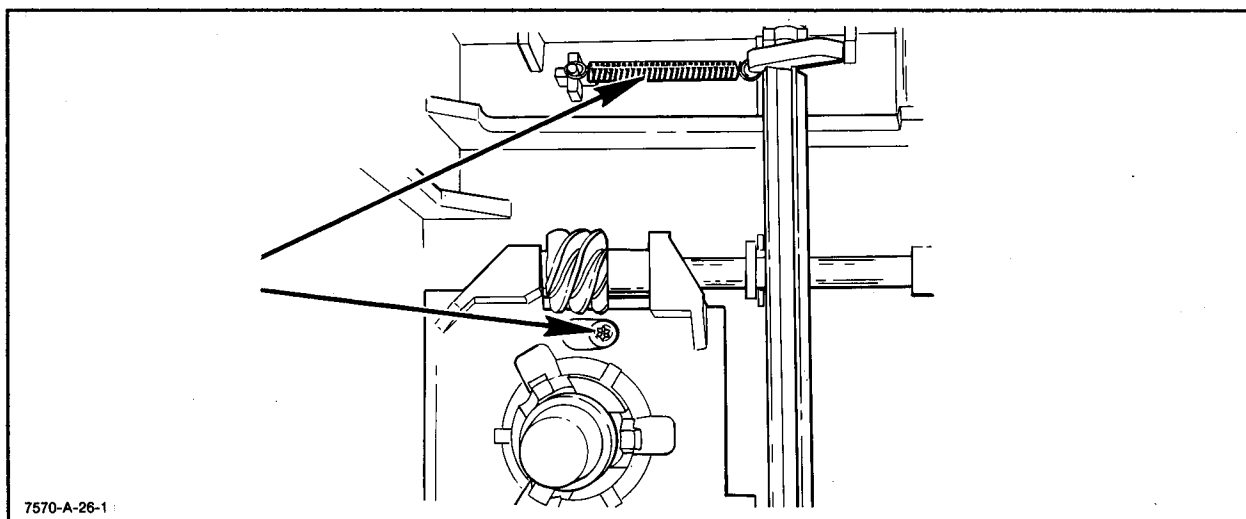


Figure 6-21. Carousel Mount

- f. Remove the self-tapping screw holding the carousel mount to the chassis. See Figure 6-21.
- g. Hold the worm gear in place and lift the rear edge of the mount, tipping it toward the front of the plotter. Lift the mount to the vertical position to release the front tabs and remove from the plotter.

6-42. To replace the carousel mount, proceed as follows:

- a. Hold the carousel mount in a vertical position and insert the front tabs into the slots.
- b. Lower the mount into position and snap it over the worm gear.
- c. Fasten with the self-tapping screw.
- d. Check to see that the worm gear will move freely.
- e. Replace the engaging lever spring.
- f. Snap the carousel turntable into position over the mount.
- g. Replace the carousel shield.
- h. Replace the left-hand chassis cover.
- i. Install the carousel.

6-43. WORM GEAR AND ENGAGING LEVER REMOVAL

6-44. To remove the worm gear and engaging lever, proceed as follows:

- a. Remove the carousel.
- b. Remove the left-hand chassis cover.
- c. Remove the carousel shield.
- d. Remove the engaging lever spring. See Figure 6-22.

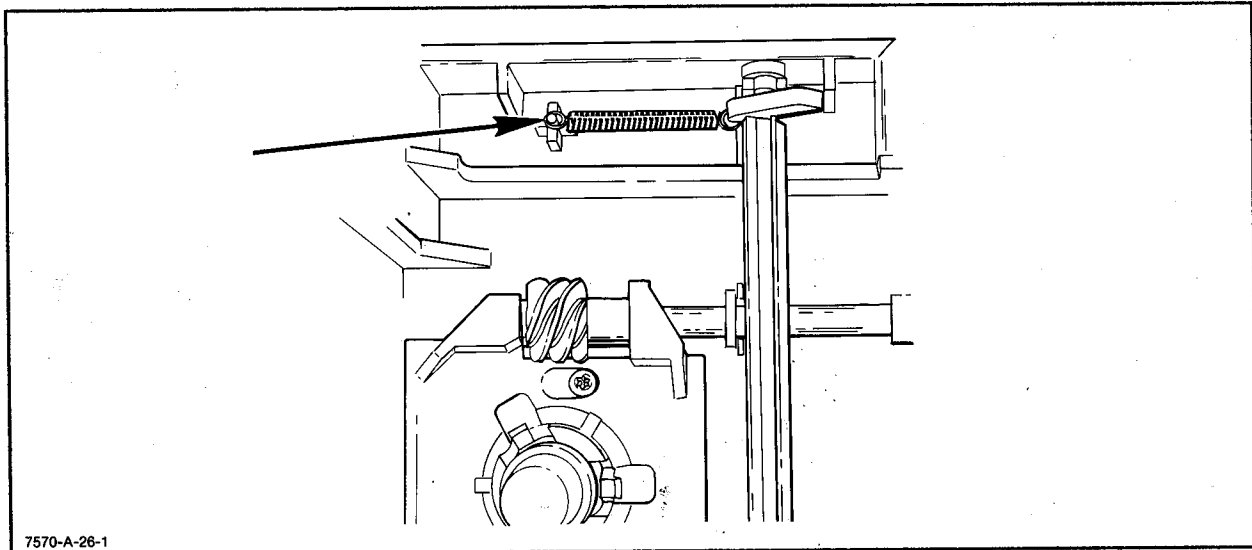


Figure 6-22. Gear Engaging lever

- e. Remove the carousel mount.
- f. The gear engaging lever, worm gear and gear shaft may now be lifted out. The worm gear is a slip fit over the end of the shaft.

6-45. To replace the worm gear and engaging lever, proceed as follows:

- a. Install the worm gear and gear shaft assembly.
- b. Install the engaging lever, assuring that the actuating arms are properly engaged in the slot on the worm gear shaft. See Figure 6-23.

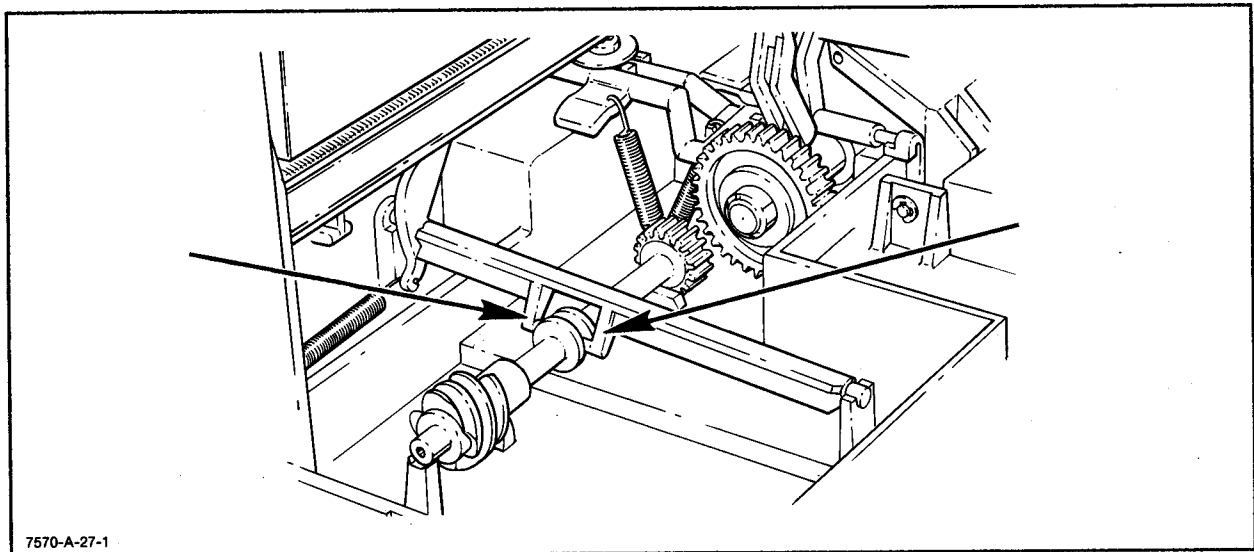


Figure 6-23. Engaging Lever Installation

- c. Replace the carousel mount.
- d. Install the spring between the engaging lever and the chassis.
- e. Check to see that the engaging lever and gear shaft will move freely.
- f. Replace the carousel shield.
- g. Replace the chassis cover.
- h. Install the carousel.

6-46. PAPER SENSOR ARM REMOVAL

6-47. To remove either paper sensor arm, proceed as follows:

- a. Remove the carousel.
- b. Remove the left- and right-hand chassis covers.
- c. Remove the center cover.
- d. Remove the carousel shield.
- e. Remove the self-tapping retaining screw. See Figure 6-24. Sensor Arm Retaining Screw.

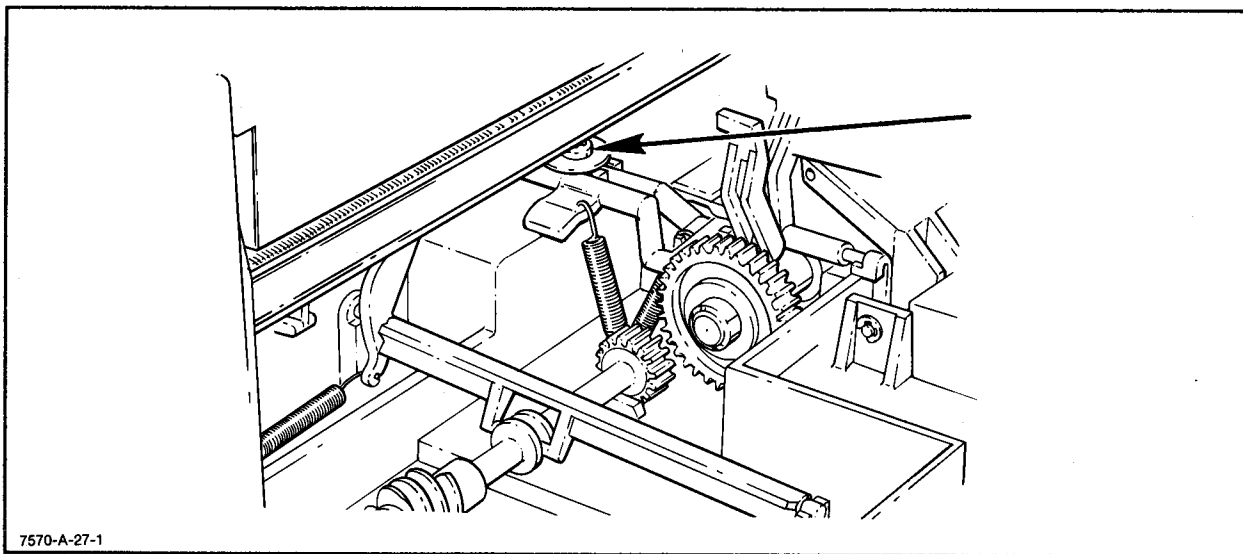


Figure 6-24. Sensor Arm Retaining Screw.

- f. Use the combination spring tool or small needle nose pliers to unhook the spring from the rear sensor arm. See Figure 6-25.

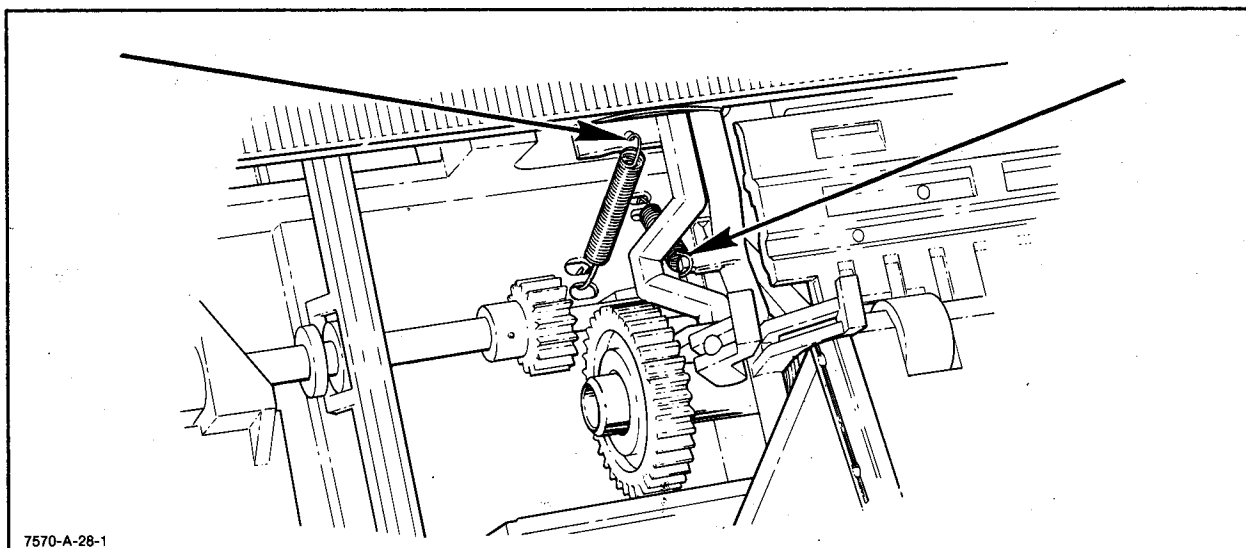


Figure 6-25. Paper Sensor Arms

- g. Lift up on the front of the arm to remove it.
- h. Unhook the spring from the front paper sensor arm.
- i. Lift up at the rear of the arm to remove it.

6-48. To replace the paper sensor arms, proceed as follows:

- a. Install the front paper sensor arm, inserting the front end first.
- b. Hook the spring from the chassis to the front paper sensor arm.
- c. Install the rear paper sensor arm, inserting the shaft at the rear first.
- d. Hook the spring from the chassis to the rear paper sensor arm.
- e. Replace the carousel shield.
- f. Replace the center chassis cover.
- g. Replace the chassis covers.

6-49. PINCH WHEEL ARM REMOVAL

WARNING

The pinch wheel arms contain heavy springs. Wear safety glasses while removing and replacing these springs. Use care to avoid the possibility of personal injury from these springs.

6-50. RIGHT-HAND PINCH WHEEL ARM REMOVAL

6-51. To remove the right-hand pinch wheel arm, proceed as follows:

- a. Remove both chassis covers.
- b. Remove the front platen.
- c. Using pliers, carefully remove the two pinch wheel tension springs from the assembly. See Figure 6-26.

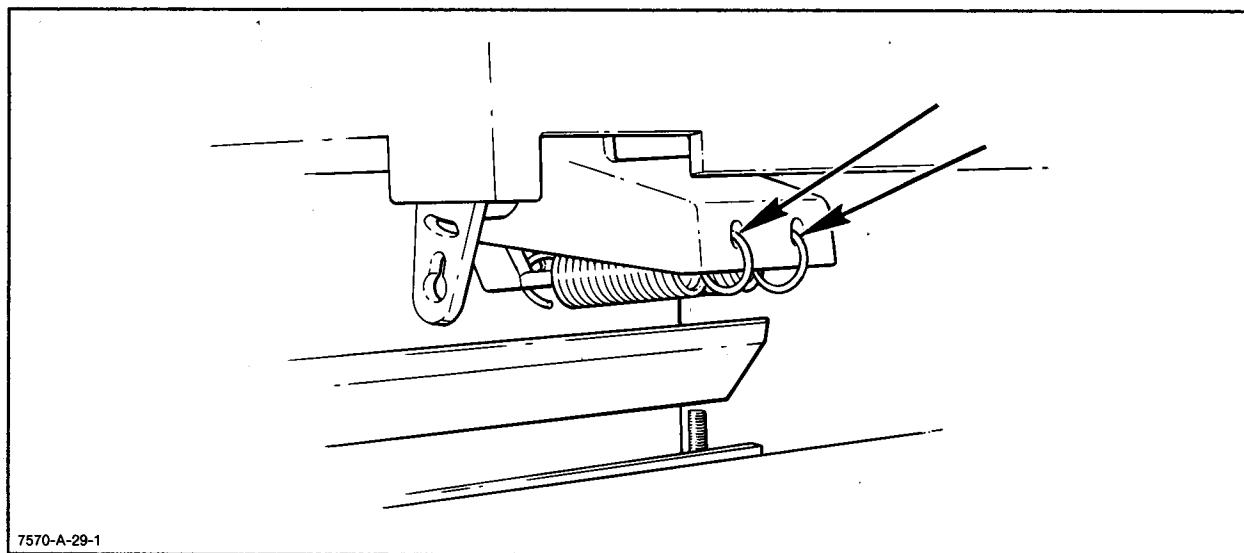


Figure 6-26. Pinch Wheel Tension Spring

- d. Remove the "E" clip from the end of the pinch wheel arm shaft. See Figure 6-27.

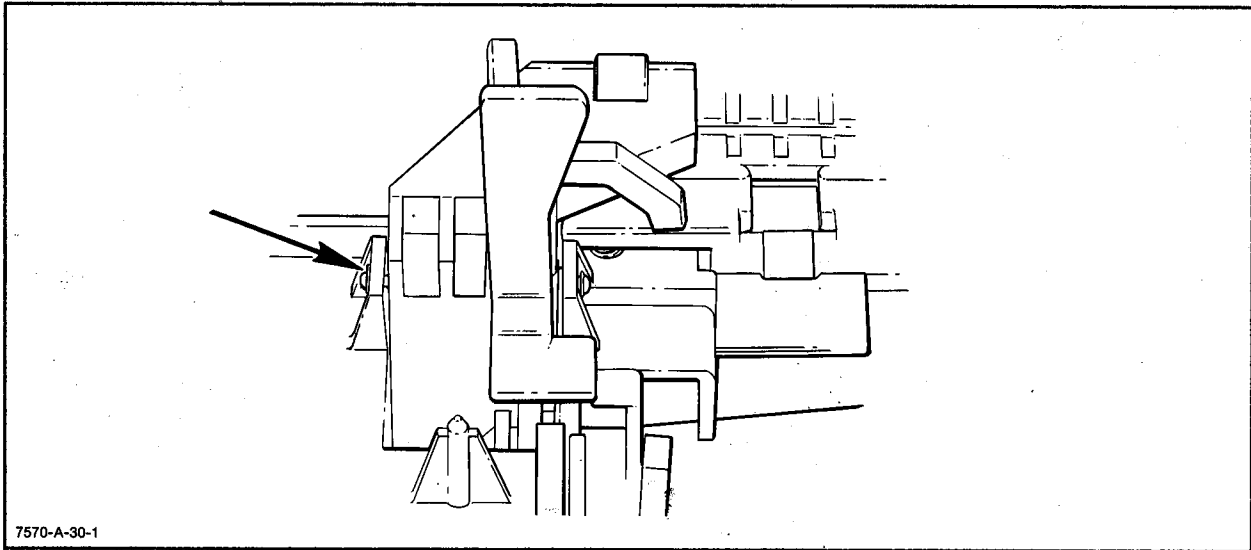


Figure 6-27. Pinch Wheel Arm

e. Remove the shaft and pinch wheel arm.

6-52. To install the pinch wheel arm, proceed as follows:

- a. Position the pinch wheel arm in the chassis and insert the shaft.
- b. Replace the "E" clip.
- c. Carefully install the pinch wheel arm springs.
- d. Replace the front platen.
- e. Replace the chassis covers.

6-53. LEFT-HAND PINCH WHEEL ARM REMOVAL

6-54. To remove the left-hand pinch wheel arm, proceed as follows:

- a. Remove both chassis covers.
- b. Remove the center cover.
- c. Remove the front platen.
- d. Remove the left-hand base.
- e. Remove the spring from the front paper alignment arm. See Figure 6-28.

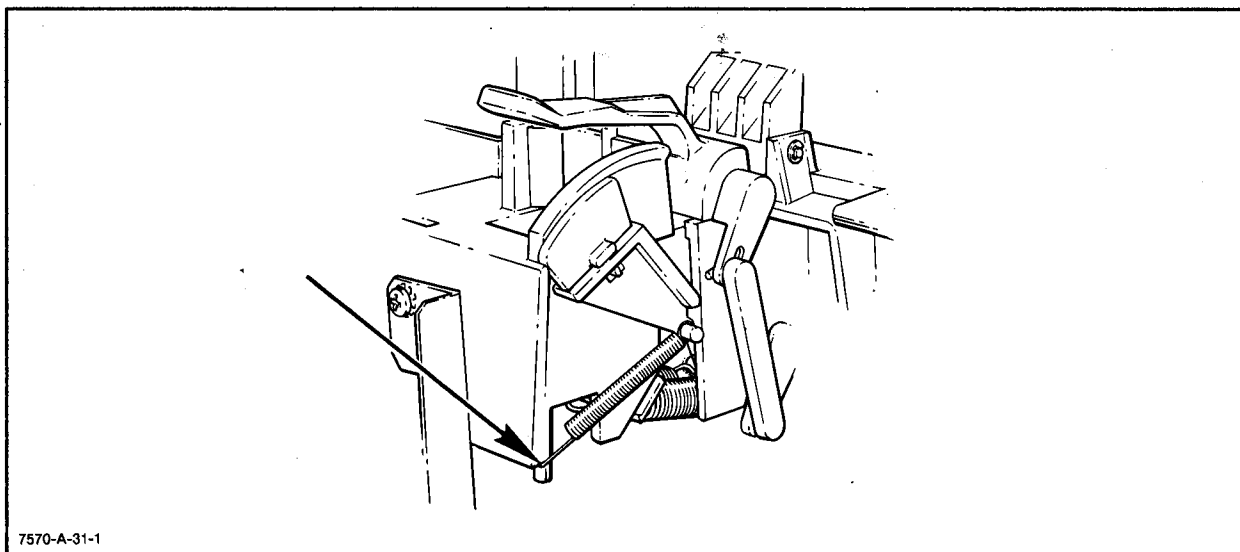


Figure 6-28. Front Paper Alignment Arm

- f. Remove the spring connected between the rear paper alignment arm and the underside of the left-hand chassis.
- g. Remove the paper sensor arms. See Figures 6-24 and 6-25.
- h. Using pliers, carefully remove the two pinch wheel tension springs. See Figure 6-26.
- i. Remove the "E" clip from the end of the pinch wheel arm shaft. See Figure 6-27.
- j. Remove the shaft and pinch wheel arm.

6-55. To install the pinch wheel arm, proceed as follows:

NOTE

Assure that the paper alignment arms are properly positioned on their pivots before installing the pinch wheel arm. See Figure 6-29

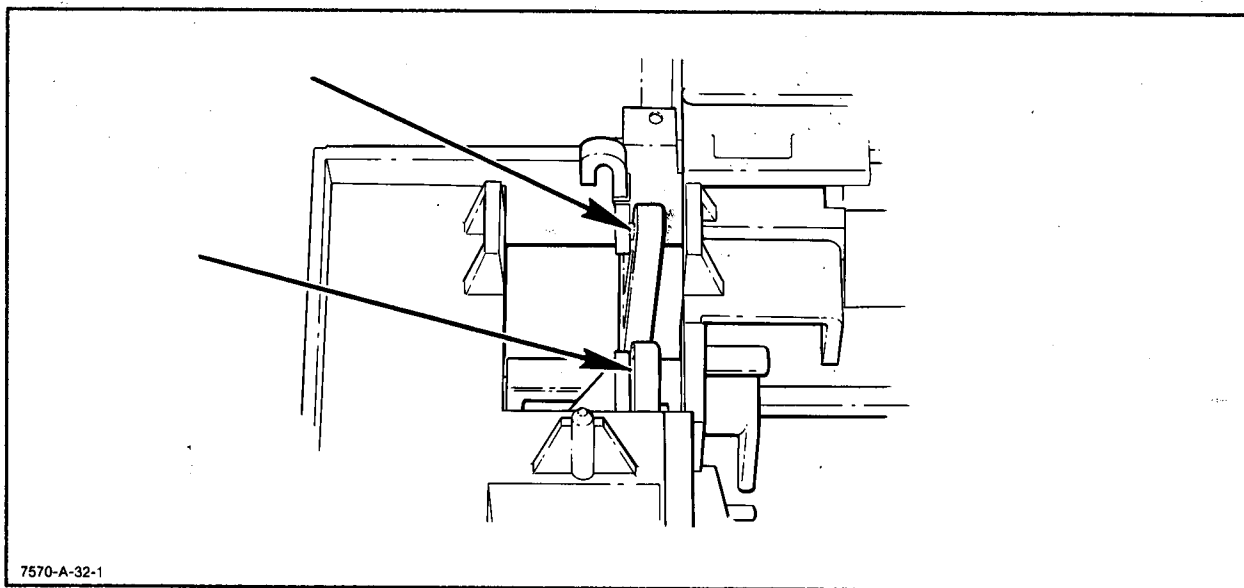


Figure 6-29. Paper Alignment Arm Pivots

- a. Replace the pinch wheel arm and insert the shaft.
- b. Replace the "E" clip.
- c. Carefully install the pinch wheel arm springs.
- d. Install the paper alignment arm springs.
- e. Replace the paper sensor arms.
- f. Replace the left-hand base.
- g. Replace the front platen.
- h. Install the center cover.
- i. Replace the chassis covers.

6-56. PAPER ALIGNMENT ARM REMOVAL

6-57. To remove the paper alignment arms, proceed as follows:

- a. Remove the left- and right-hand chassis covers.
- b. Remove the center cover.
- c. Remove the front and rear paper sensor arms.
- d. Remove the front platen.
- e. Remove the left-hand base.
- f. Remove the left-hand pinch wheel arm.
- g. Disconnect the spring from the front paper alignment arm, and remove the arm. See Figure 6-26.
- h. Remove the spring connected between the rear paper alignment arm and the underside of the left-hand chassis.
- i. The rear paper alignment arm may now be removed. See Figure 6-29.

6-58. To install the paper alignment arms, proceed as follows:

- a. Place the rear alignment arm over the pivot point.
- b. Place the front alignment arm over the pivot.
- c. Install the left-hand pinch wheel arm.
- d. Install the paper alignment arm springs.
- e. Replace the left-hand base.
- f. Install the paper sensor arms.
- g. Install the center cover.
- h. Replace the chassis covers.

6-59. CENTER PLATEN REMOVAL

6-60. To remove the center platen, proceed as follows:

- a. Remove the left-hand, right-hand, and center chassis covers.
- b. Remove the front and rear platens.

- c. Remove the paper sensor arms.
- d. Remove the left and right pinch wheel arms
- e. Move the pen carriage assembly fully to the left.
- f. Remove each of the four spring clips from the center platen by squeezing the clip. See Figure 6-30.

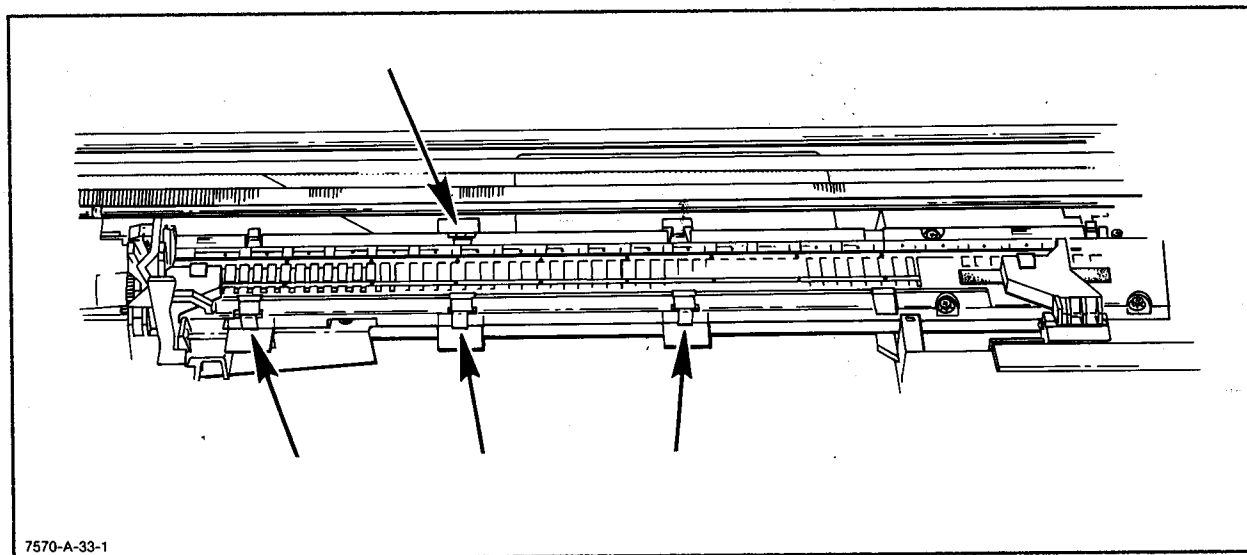


Figure 6-30. Platen Clips

- g. Remove the three #20 TORX machine screws securing the right-hand end of the center platen. See Figure 6-31.
- h. Lift up on the front edge of the center platen and remove it from the plotter.

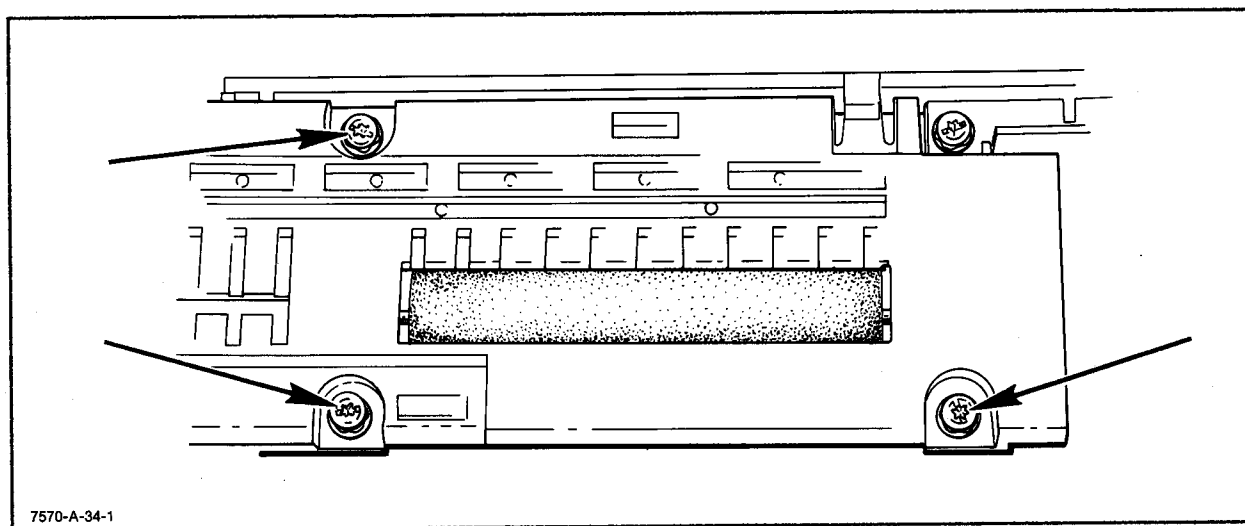


Figure 6-31. Platen Mounting Screws

6-61. To replace the center platen, proceed as follows:

- a. Lower the rear edge of the center platen into position, aligning the platen tabs with the slots on the plotter.
- b. Lower the platen into position and secure with the three machine screws and the four spring clips.
- c. Carefully align any gaskets which may have been moved or removed.
- d. Replace the pinch wheel arms.
- e. Replace the paper sensor arms.
- f. Replace the front and rear platens.
- g. Replace the center cover.
- h. Replace the left- and right-hand chassis covers.

6-62. DRIVE SHAFT ASSEMBLY REMOVAL

6-63. To remove the drive shaft assembly, proceed as follows:

- a. Remove the left-hand, center, and right-hand chassis covers.
- b. Remove the front and rear platens.
- c. Remove the paper sensor arms.
- d. Remove the pinch wheel arm assemblies.
- e. Remove the center platen.
- f. Remove the drive tension spring from the drive shaft tensioner assembly. See Figure 6-15.
- g. Remove the paper-axis drive belt from the motor pulley.
- h. Remove the tensioner assembly by inserting a common screwdriver between the tensioner and the chassis, and prying carefully to release the tabs on the back of the tensioner.

NOTE

The slider rod restraint will still be looped around the main drive belt. Use care not to damage the belt when moving the restraint.

- i. Remove the screw securing the slider rod restraint to the chassis. See Figure 6-32.

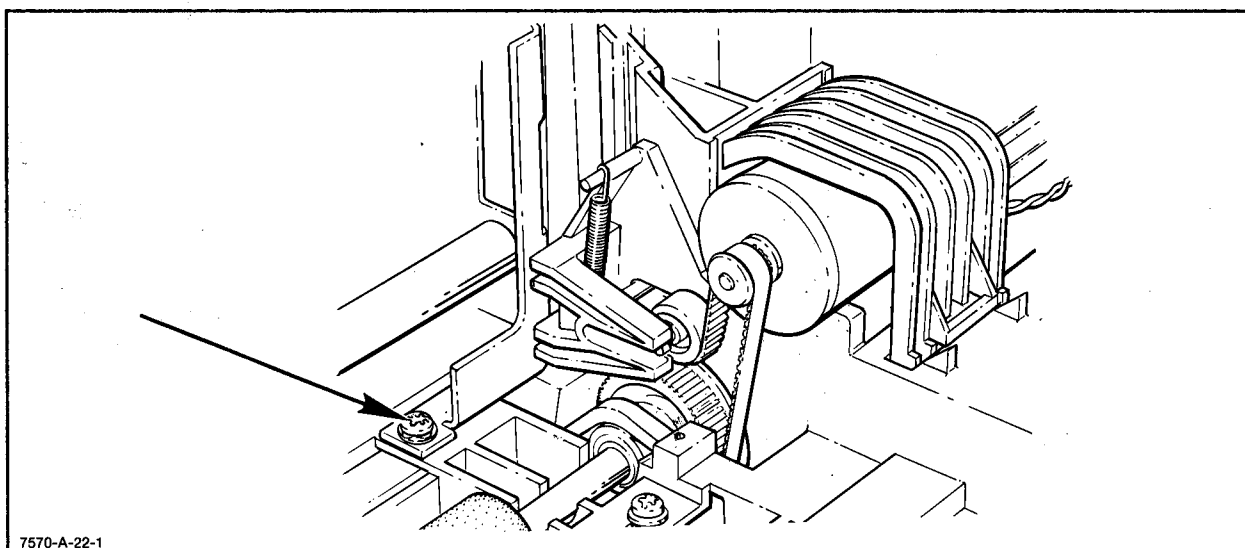


Figure 6-32. Slider Rod Restraint

- j. Carefully bend the aluminum shield aside and lift up on the restraint, allowing access to the right-hand bearing clamp.
- k. Use a common screwdriver to unhook both bearing clamps from the chassis and remove them. See Figure 6-33.
- l. The shaft may now be lifted from the plotter.

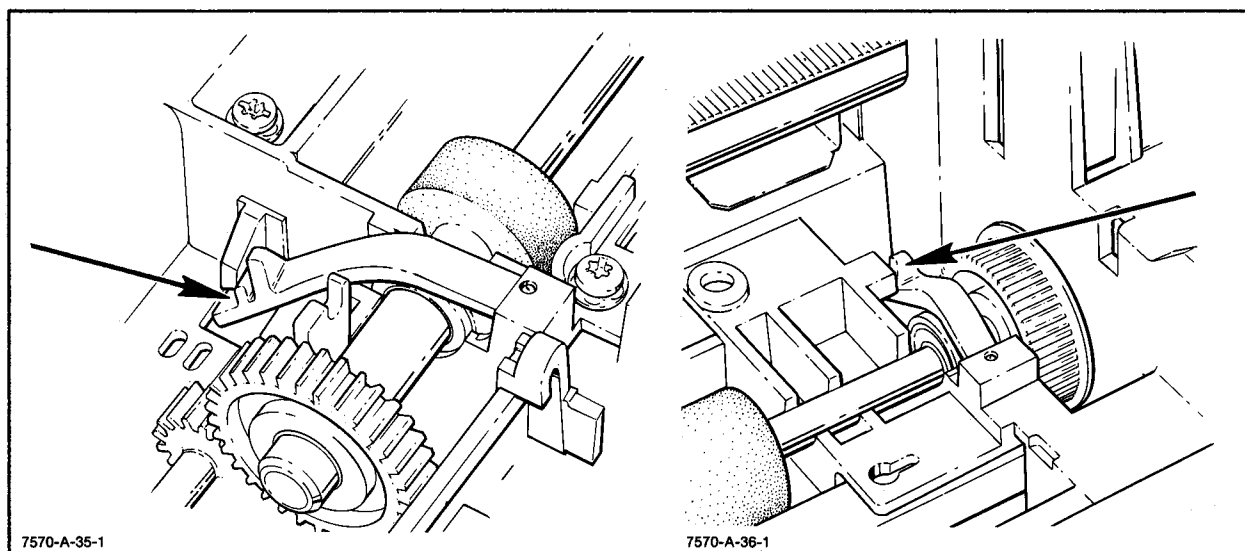


Figure 6-33. Drive Shaft Bearing Clamps

6-64. To replace the drive shaft assembly, proceed as follows:

NOTE

Place the drive belt over the shaft drive gear before installing the shaft.

- a. Install the shaft assembly, assuring that all three bearing assemblies are properly seated in the chassis.
- b. Install the bearing clamps.
- c. Properly seat the slider rod restraint and replace the screw.
- d. Install the belt tensioner assembly.
- e. Loop the drive belt around the motor gear.
- f. Install the drive belt tension spring.
- g. Assure that the shaft will turn freely.
- h. Replace the center platen.
- i. Replace the pinch wheel arm assemblies.
- j. Replace the paper sensor arms.
- k. Install the front and rear platens.
- l. Install the left-hand, center, and right-hand chassis covers.

6-65. MAIN BELT REMOVAL

WARNING

The main belt tensioner spring is under pressure in the plotter. Wear safety glasses and exercise extreme caution when releasing the spring. Serious injury could result if the spring is not handled properly.

6-66. To remove the main belt, proceed as follows:

- a. Remove the left- and right-hand chassis covers.
- b. Remove the center cover.
- c. Reach up under the edge of the left-hand chassis and very carefully pull the tensioner tab toward the end of the plotter. Position the other hand against the spring to prevent the spring and tensioner from snapping loose. See Figure 6-34.

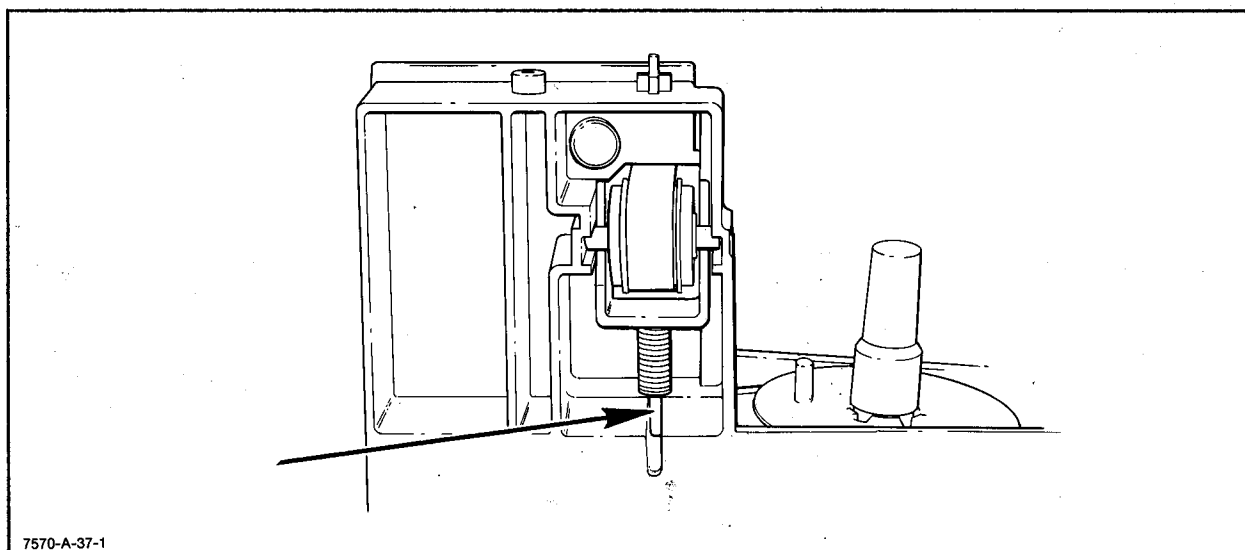


Figure 6-34. Main Belt Tensioner

- d. The tensioner and spring may be carefully removed from the plotter.
- e. The idler pulley and main belt are now free of the left-hand chassis assembly.
- f. Disconnect the belt from the pen carriage assembly. See Figure 6-35.

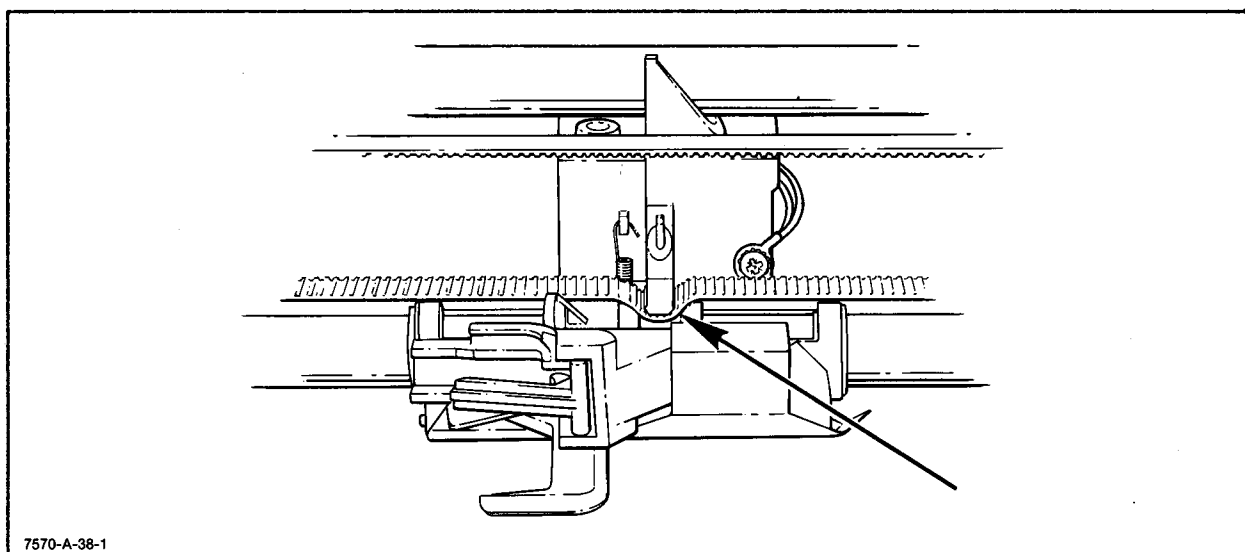


Figure 6-35. Pen Carriage and Main Belt

- g. Remove the screw from the slider rod restraint. See Figure 6-32.
- h. Loosen the two screws securing the front panel assembly. See Figure 6-8.
- i. Disconnect the drive belt tension spring from the tensioner assembly at the back of the right-hand chassis assembly. See Figure 6-17.
- j. Unhook the drive belt from around the motor gear.

- k. The axle on the double pulley assembly may now be snapped loose from the chassis.
- l. Remove the double pulley and the main belt from the top of the right-hand chassis assembly. See Figure 6-36.

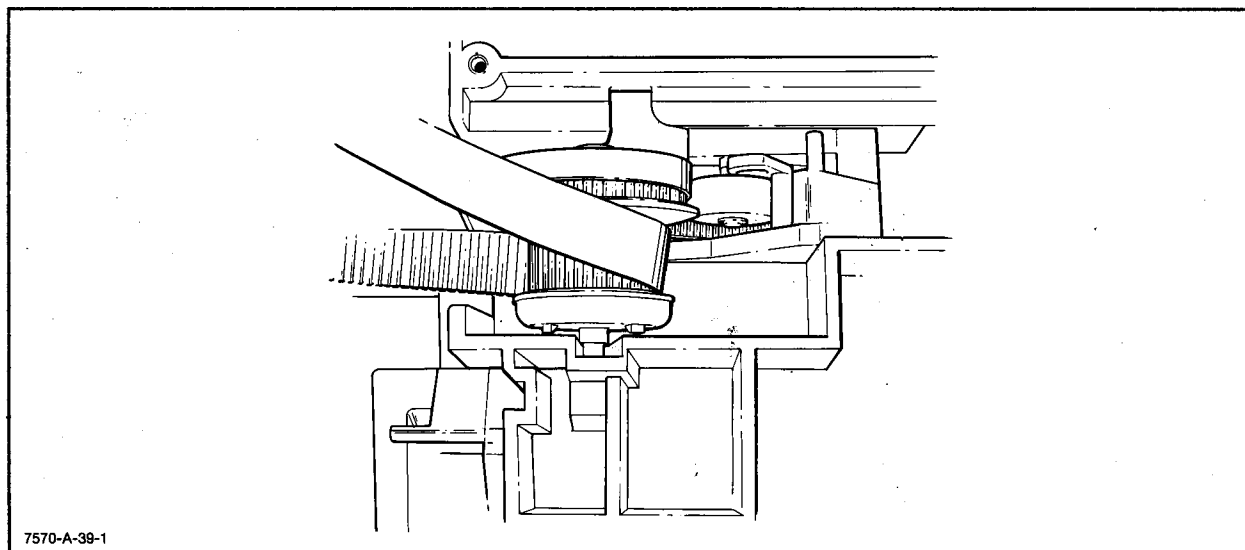


Figure 6-36. Double Pulley and Belt

6-67. To install the main belt, proceed as follows:

- a. Place the main belt and drive belt around the double pulley assembly.
- b. Install the double pulley through the top of the right-hand chassis assembly. Snap the axle into place.
- c. Hook the drive belt around the motor gear.
- d. Install the drive belt tension spring.
- e. Replace and secure the front panel assembly and the slider rod restraint.
- f. Connect the main belt to the pen carriage assembly.
- g. Loop the main belt around the idler pulley.
- h. Insert the idler and belt through the opening in the left-hand chassis assembly.
- i. Place the tensioner spring on the tensioner tab.
- j. Insert the tensioner behind the idler pulley.
- k. Carefully compress the spring and insert the tab into the slot in the chassis, pressing inward until the tensioner is fully seated.
- l. Install the center cover.
- m. Install the left- and right-hand chassis covers.

6-68. PEN SOLENOID REMOVAL

6-69. To remove the pen solenoid, proceed as follows:

- a. Remove the left- and right-hand chassis covers.
- b. Remove the center cover.
- c. Loosen the machine screw in the solenoid. See Figure 6-37.

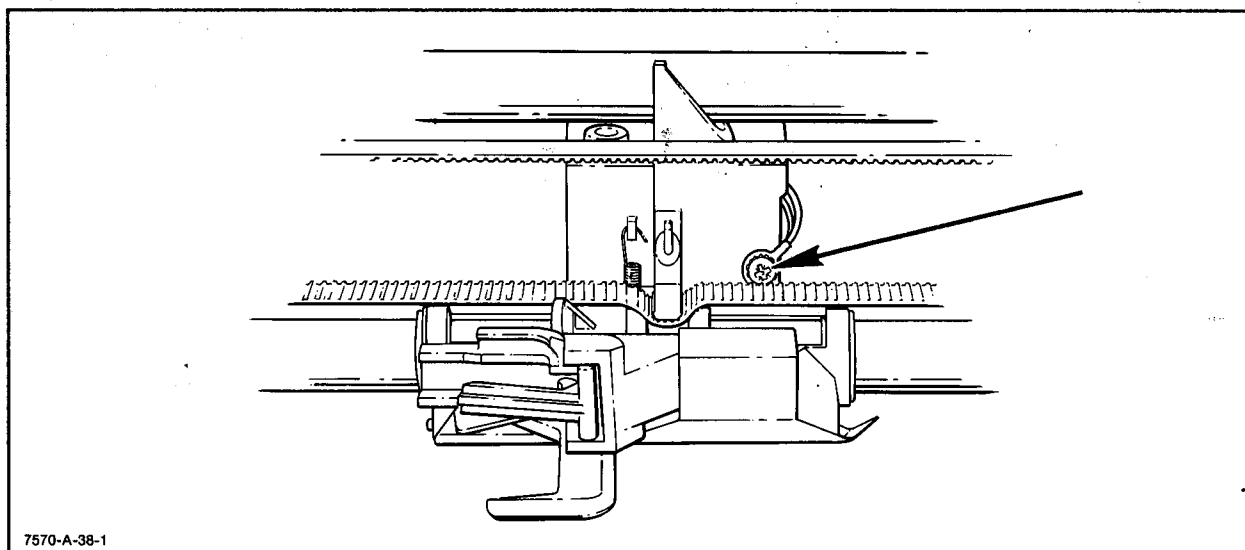


Figure 6-37. Solenoid Removal

CAUTION

The solenoid plunger and spring are not captive. Removal of the solenoid will allow them to come free. Assure that the plunger and spring are not allowed to fall during solenoid removal.

- d. Carefully remove the solenoid from the bracket.

6-70. To Install the pen solenoid, proceed as follows:

NOTE

When replacing the solenoid, assure that the ground lead is secured with the solenoid mounting screw.

- a. Install the spring and plunger into the solenoid.
- b. Compress the plunger and slip the assembly into the bracket on the pen carriage.
- c. Install the machine screw to secure the solenoid and the ground cables.
- d. Install the center cover.
- e. Connect the trailing cable to the solenoid and clip into position on the pen carriage.
- f. Install the left- and right-hand chassis covers.

6-71. PEN CARRIAGE ASSEMBLY REMOVAL

WARNING

The main belt tensioner spring is under pressure in the plotter. Wear safety glasses and exercise extreme caution when releasing the spring. Serious injury could result if the spring is not handled properly.

CAUTION

Do not remove the dash-pot piston from the cylinder. The surface of the piston could easily be damaged by contact with oils in the skin, resulting in poor operation of the plotter. If the piston accidentally slips out of the cylinder do not touch the piston surface. Handle the piston only by the connecting rod.

NOTE

The solenoid assembly, noise damping pads, dash pot, and the pen carriage springs are the only field replaceable parts of the pen carriage assembly. Any of these may be removed without removing the pen carriage from the plotter.

6-72. To Remove the pen carriage assembly, proceed as follows:

- a. Remove the left-hand, center, and right-hand chassis covers.
- b. Carefully remove the main belt tensioner and idler pulley.
- c. Disconnect the main belt from the pen carriage.

- d. Remove the slider rod restraint. See Figure 6-38.

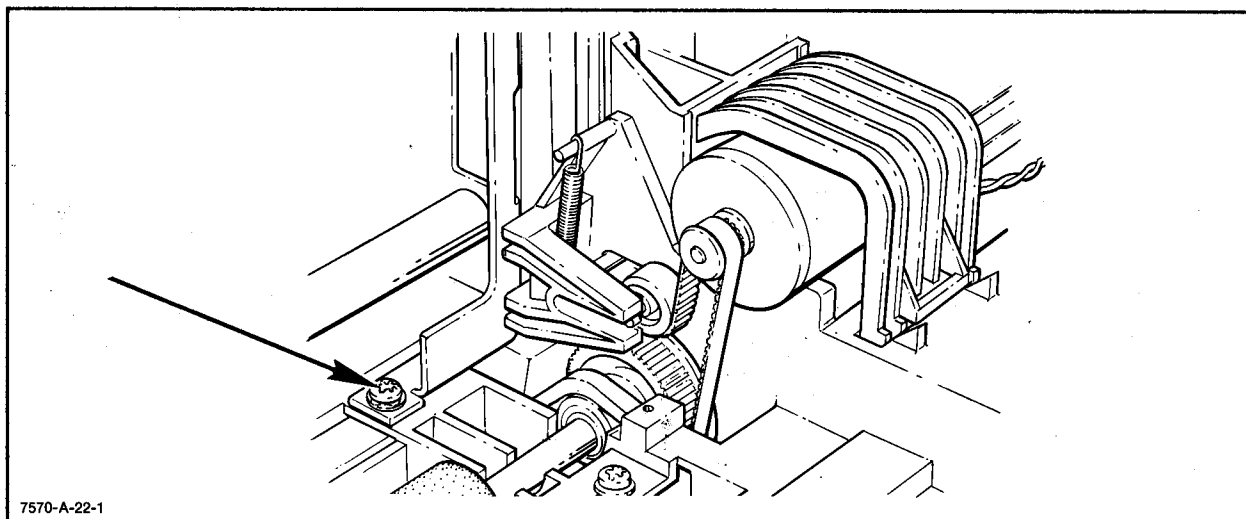


Figure 6-38. Slider Rod Restraint

- e. Remove the slider rods.
f. Remove the pen carriage assembly from the slider rod.

6-73. To install the pen carriage assembly, proceed as follows:

- a. Place the pen carriage assembly on one slider rod.
b. Place the rod in the lower slider rod position.
c. Install the upper slider rod, assuring that rod is positioned properly in the upper portion of the pen carriage assembly. See Figure 6-39.

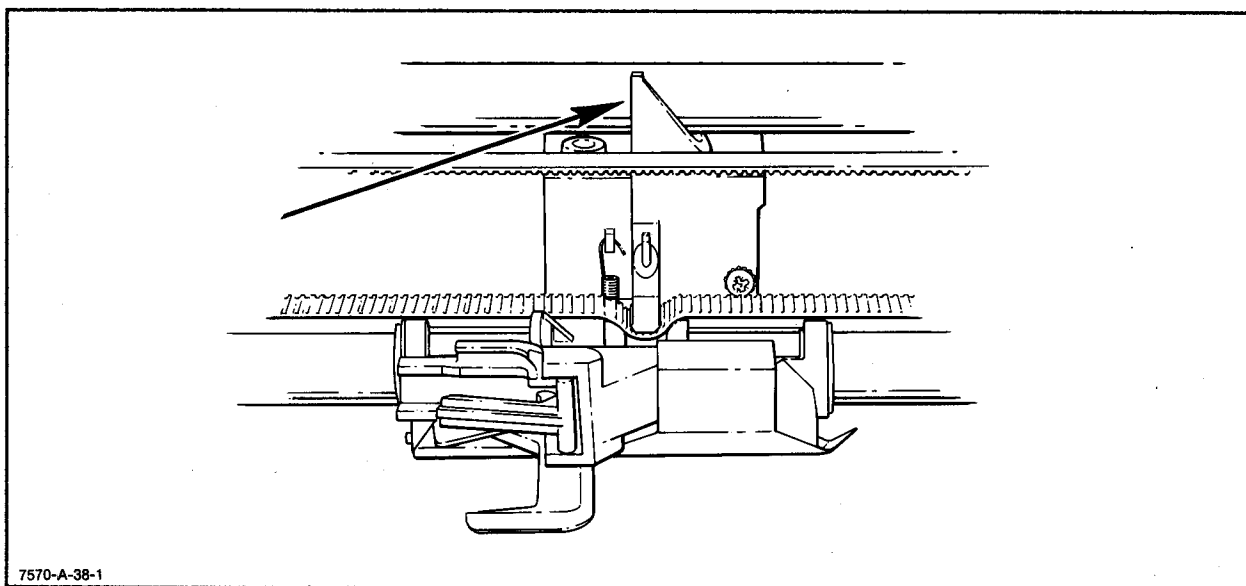


Figure 6-39. Pen Carriage Assembly

- d. Install the slider rod clamp.
- e. Connect the main belt to the pen carriage.
- f. Install the main idler pulley and main belt tensioner.
- g. Install the center cover.
- h. Install the left- and right-hand chassis covers.

6-74. FAN AND TRANSFORMER MODULE REMOVAL

6-75. To remove the fan and transformer module, proceed as follows:

- a. Remove the left- and right-hand chassis covers.
- b. Remove the center cover.
- c. Remove the front and rear platens.
- d. Remove the center platen.
- e. Remove the nut securing the module ground cable (54) to the plotter. See Figure 6-40.

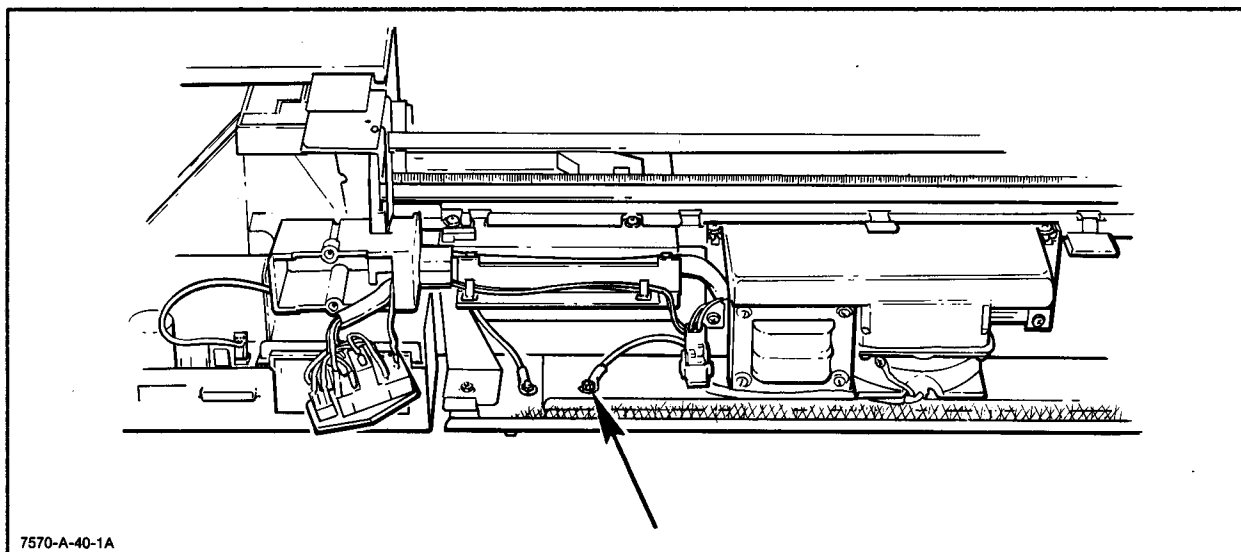


Figure 6-40. Ground Cables

NOTE

If replacing the fan only, skip steps f. and g.

f. Disconnect the transformer secondary leads (2) from the PCA. See Figure 6-41.

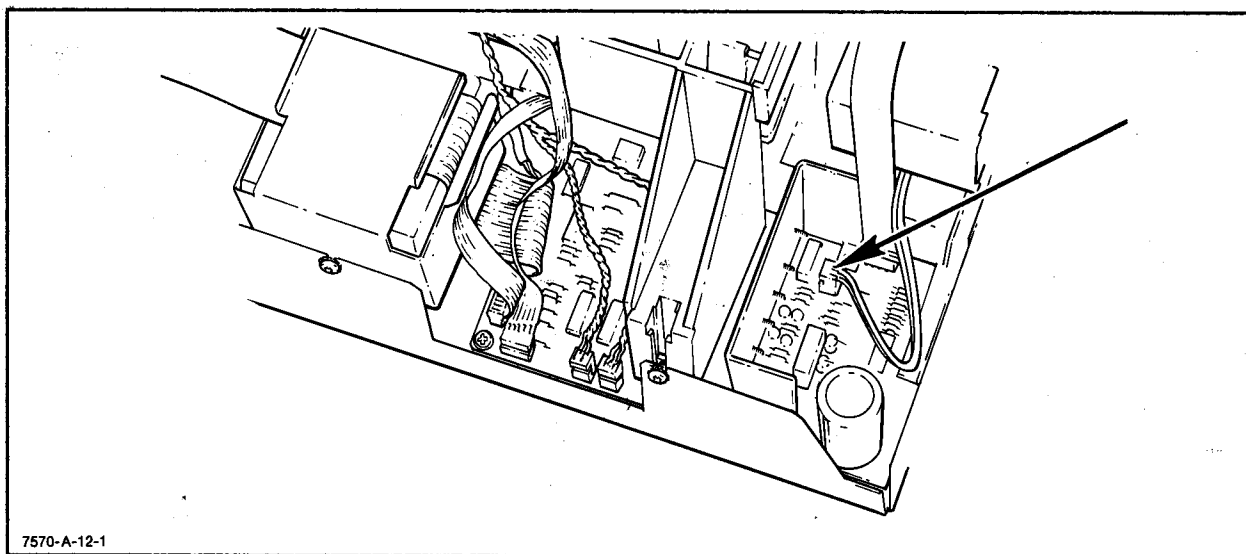


Figure 6-41. Transformer Secondary Connections

g. Disconnect the transformer primary leads from the ac power module. See Figure 6-42.

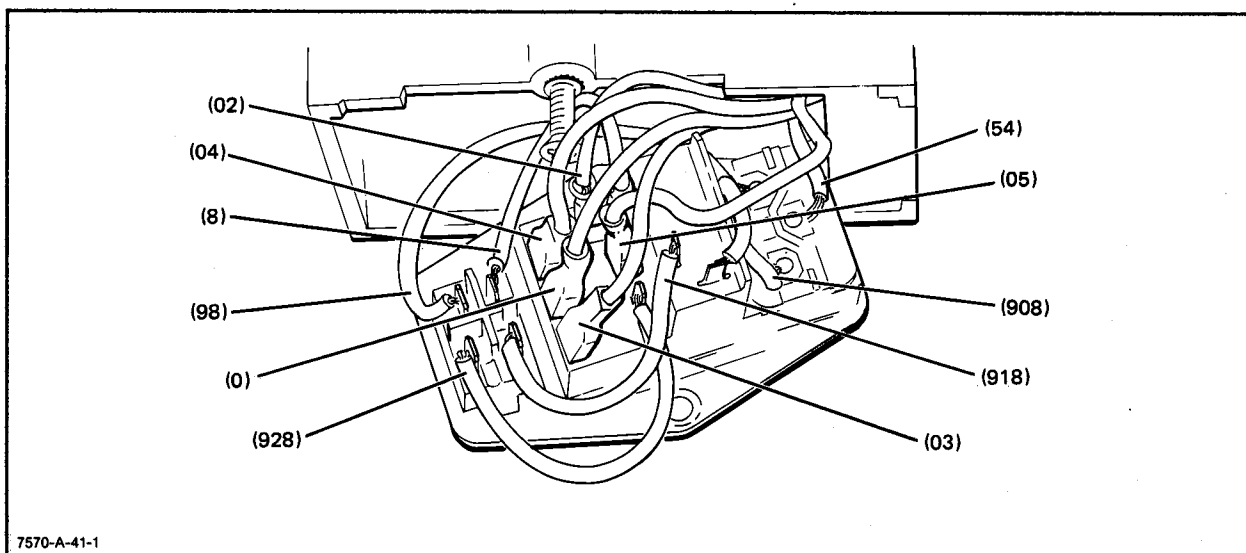


Figure 6-42. AC Power Module

- h. Remove the two machine screws from the top of the fan and transformer module. See Figure 6-43.

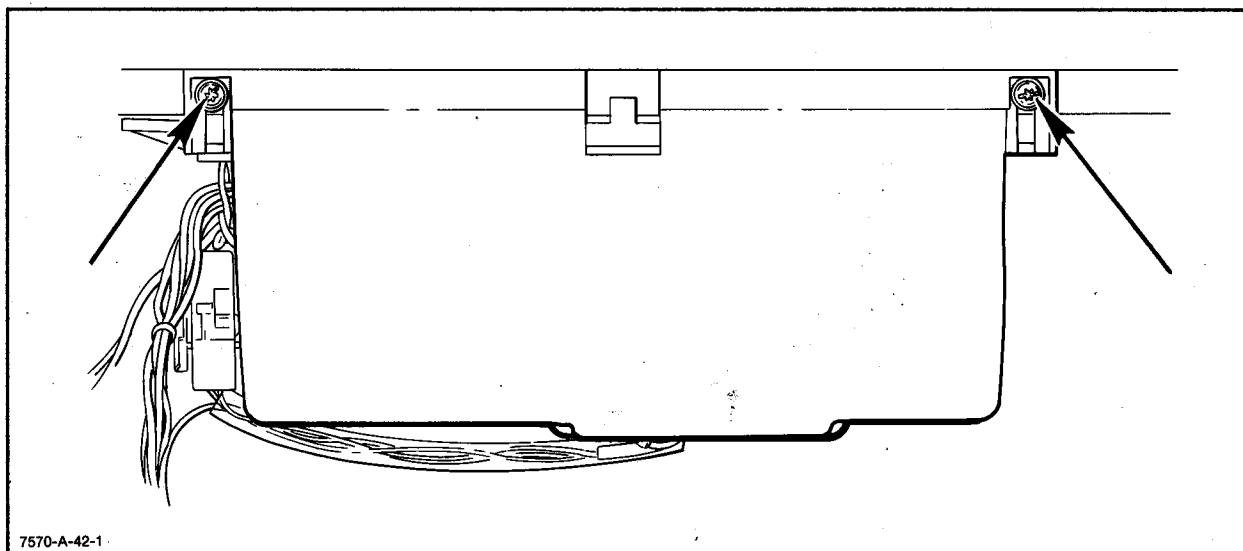


Figure 6-43. Fan and Transformer Module

- i. Loosen the 2 screws clamping the module to the lip of the datum bar. See Figure 6-44.
- j. Lift the fan and transformer module from the plotter.
- k. To remove the fan, remove the four self-tapping screws holding the fan to the module.

6-76. To install the fan and transformer module, proceed as follows:

- a. Place the module in position on the datum bar. Assure that the notches at the lower edge of the module are over the lip of the datum bar. See Figure 6-44.

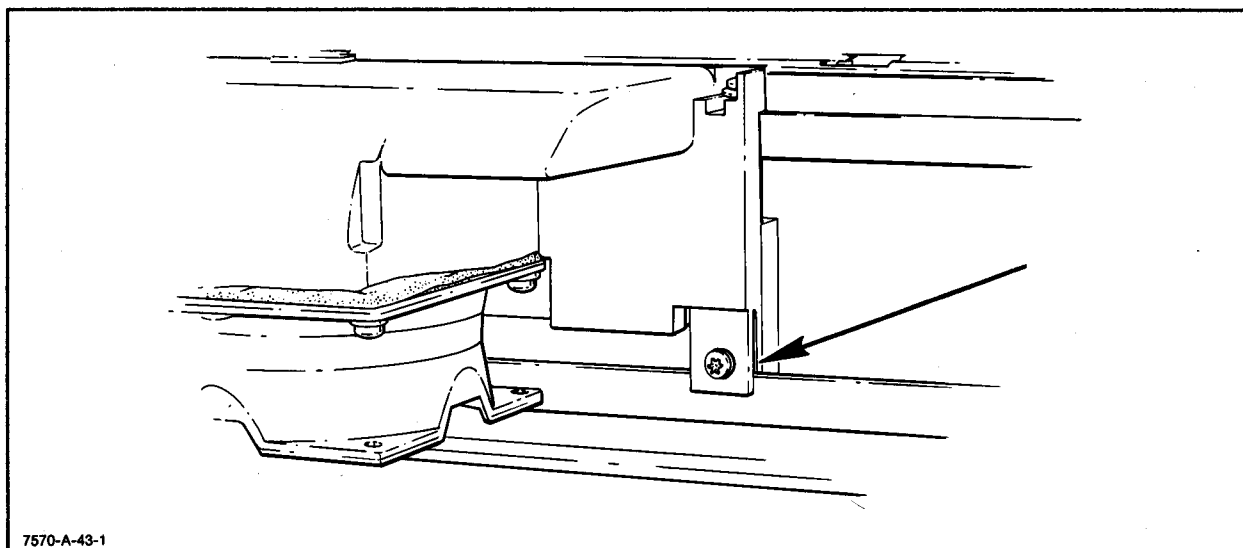


Figure 6-44. Fan and Transformer Module Installation

- b. Secure the module with the two machine screws.
- c. Tighten the 2 module clamping screws. See Figure 6-44.
- d. Route the transformer cables through the cable clamps.
- e. Connect the five primary cables the the ac power module. See Figure 6-45.

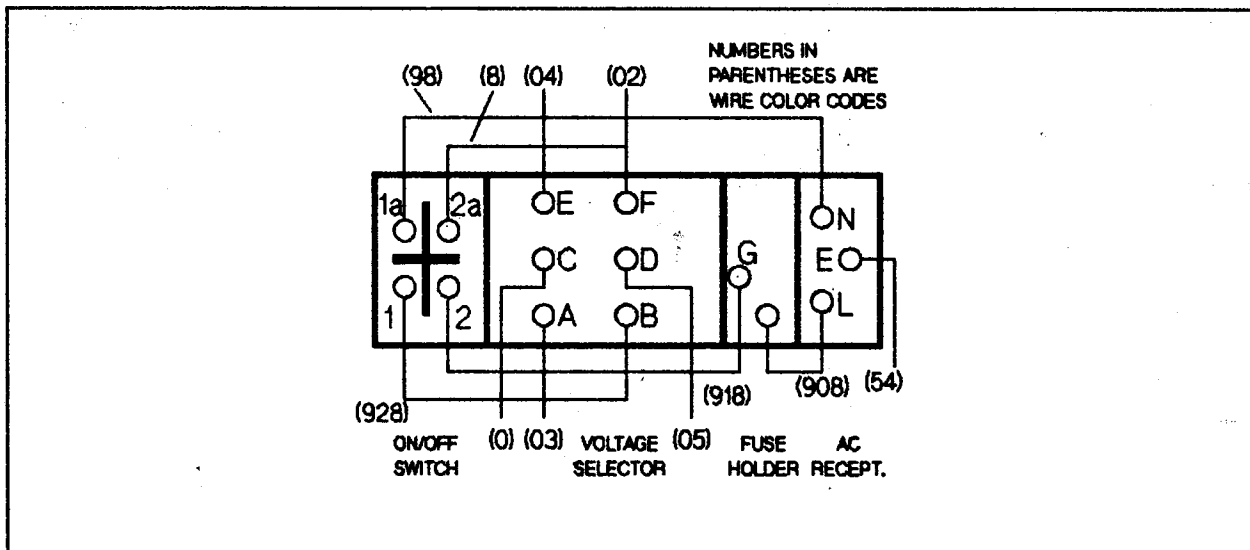


Figure 6-45. Power Module Wiring

WARNING

Make certain that the ground cable is securely fastened to the plotter chassis. Failure to securely fasten this cable may create an electrical shock hazard.

- f. Connect the transformer secondary cable to the PCA.
- g. Connect the transformer ground cable to the plotter with the nut. Tighten securely.
- h. Replace the center platen.
- i. Replace the front and rear platens.
- j. Replace the center cover.
- k. Replace the left- and right-hand chassis covers.

6-77. PINCH WHEEL SENSOR SWITCH REMOVAL

6-78. To remove the pinch wheel sensor switch, proceed as follows:

- a. Remove the chassis covers.
- b. Remove the front platen.
- c. Disconnect all cable assemblies from PCA.
- d. Remove the right-hand base and PCA.

WARNING

The pinch wheel arm contains heavy springs. Wear safety glasses and use extreme caution to avoid personal injury while removing or installing these springs.

- e. Remove the two springs from the right-hand pinch wheel assembly. See Figure 6-24.
- f. Move the pinch wheel handle to lower the pinch wheels.
- g. Disconnect the sensor switch spring from the switch. See Figure 6-46.

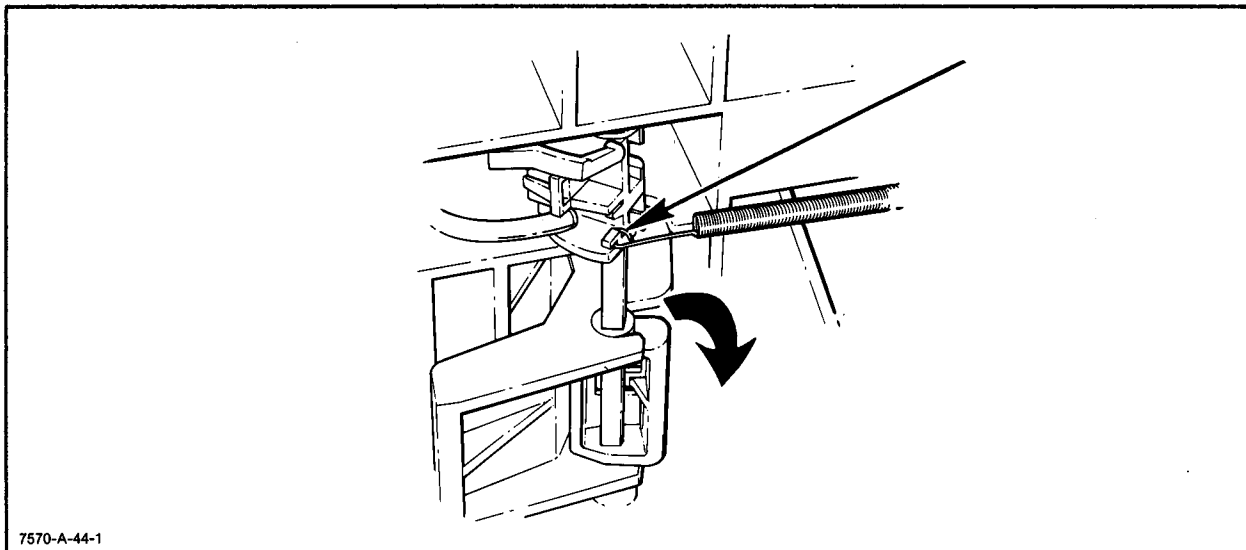


Figure 6-46. Pinch Wheel Sensor Switch

- h. Grasp the pinch wheel lift bar and pull carefully to the right and down as illustrated by the heavy arrow in Figure 6-46. This will separate the pinch wheel cam from the arm.
- i. The sensor switch assembly may now be removed from the end of the bar.

6-79. To install the pinch wheel sensor switch, proceed as follows:

NOTE

When replacing the pinch wheel sensor switch, assure that the unused contact of the switch is pointed down when the pinch wheels are in the down position.

- a. Place the pinch wheels in the down position.
- b. Place the sensor switch assembly over the end of the pinch wheel lift bar, assuring that it is correctly aligned.
- c. Guide the pinch wheel cam up into the arm assembly.
- d. Connect the sensor switch spring to the chassis. See Figure 6-46.
- e. Replace the pinch wheel springs.
- f. Replace the right-hand base and PCA.
- g. Connect all cable assemblies to the PCA. See Figure 6-13.
- h. Replace the front platen.
- i. Replace the chassis covers.

7-1. INTRODUCTION

7-2. This chapter would normally contain procedures for the performance of mechanical and electrical adjustments on the HP 7570. **There are no mechanical or electrical adjustments.**

8-1. INTRODUCTION

8-2. This chapter contains the information necessary to efficiently isolate a defect in the HP 7570. Several levels of troubleshooting information is presented to help isolate a problem either to an assembly level or to a component level.

8-3. SAFETY CONSIDERATIONS

WARNING

To avoid personal injury, use extreme caution while performing any of the troubleshooting procedures. Removal of the top cover exposes live circuits.

Connecting the ac line cord with the rear panel removed will expose ac primary wiring. Line voltage is present even when the line switch is OFF. Contact with these hazardous voltages may lead to personal injury or death.

CAUTION

The procedures in this chapter are intended for service trained personnel only. Failure to properly follow these procedures may lead to permanent damage to the plotter.

Component level repair on the PCA should be performed by qualified service personnel in a bench repair facility. to avoid possible permanent damage to the assembly.

8-4. RECOMMENDED TEST EQUIPMENT

8-5. Test Equipment required to maintain the HP 7570 is listed in Table 8-1.

Table 8-1. Recommended Test Equipment

Type	Recommended Model
Computer/Controller	HP-85 Personal Computer with appropriate interface HP 82937A HP-IB Parallel Interface HP 82939A RS-232-C Interface HP 17355M RS-232-C Interface Cable
ROM Drawer	HP 82936A
I/O ROM	HP 00085-15003
Digital Multimeter	HP 3465A
Oscilloscope	HP 1741A 100 MHz or greater
Optical Comparator	B&L 81-34-35
I/O Loopback Connector	HP 07440-60302
Metric Scale 0-1000 mm	
HP-85 Plotter Service Tape	HP 5010-2585

8-6. TROUBLESHOOTING STRATEGY

8-7. Several levels of diagnostics have been built into the HP 7570 plotter. It is possible to quickly isolate a problem to a major assembly which may be replaced, or to use more extensive testing to isolate the problem to an individual component. On power-up the plotter will automatically run diagnostics to give the operator an immediate go/no-go indication. Testing beyond this level must be reserved for qualified service personnel.

8-8. DIAGNOSTIC OPERATING TESTS

8-9. Power-On Self-Test

8-10. When ac line voltage to the plotter is turned ON (I) a series of built-in tests are automatically performed to verify proper plotter operation. The test sequence will run either to completion, at which time normal plotter operation will begin, or to an error condition. An error will cause the test to stop, which prevents normal plotter operation. The front panel LEDs will display failure information. The LEDs are illustrated in Figure 8-1. An error condition may be displayed either by

the front panel LEDs flashing on and off, indicating that the test circuitry received bad data from a particular portion of the circuitry, or by the LED error display remaining on steadily, indicating no response from some portion of the circuitry. The only exit from an error condition is to turn OFF (O) ac power to the plotter. Table 8-2 lists test steps and detailed diagnostic information for the power on self test.

8-11. During normal operation of the plotter the two servo systems are continuously being monitored. If an error condition occurs, the servos will be shut down, and the front panel LEDs will display a flashing error code.

NOTE

If the Self-Test fails steps 5 through 8 with an option module installed, remove the module, cycle power, and run the test again.

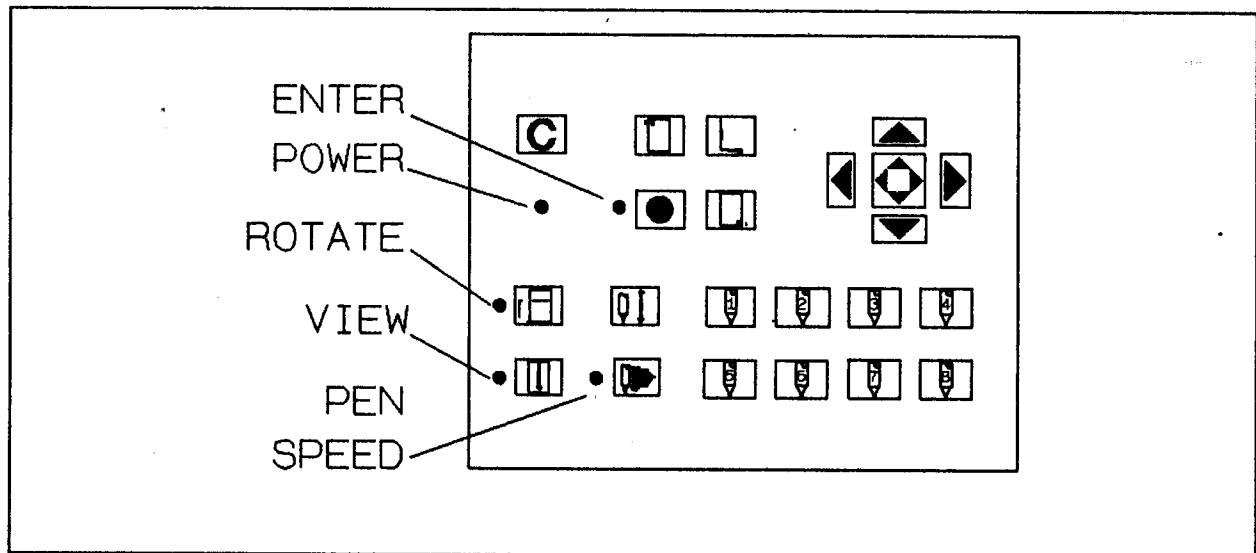


Figure 8-1. Front Panel LEDs

Table 8-2. Power-On Self Test

STEP:

1

TEST:

Front Panel LEDs

NORMAL INDICATION:

Front Panel LEDs cycle one at a time; VIEW, ROTATE, ENTER, & SPEED.

CIRCUIT/MECHANICS TESTED:

- Slave Microprocessor (U9); write (SWR) line, Port 0, some ROM.
- Servo IC (U13); decoding, LED Drivers, cables, & front panel.

TROUBLESHOOTING:

IF - Power LED only

CHECK - clock, reset, servo IC (U13), bus, front panel wiring & SRD line.

IF - Any one LED does not light

CHECK - front panel, servo IC, cabling.

IF - Two LEDs on simultaneously

CHECK - for shorts in servo IC output or front panel,

IF - All LEDs on.

CHECK - clock and reset

STEP:

2

TEST:

Slave Microprocessor (U9) Internal ROM

FAILURE INDICATION:

SPEED LED flashing - data error

SPEED LED on steadily - test stopped

CIRCUIT/MECHANICS TESTED:

- Slave Microprocessor (U9); 4 Kbyte internal ROM

TROUBLESHOOTING:

IF - SPEED LED Flashes

REPLACE - Slave microprocessor (U9)

IF - SPEED LED on steadily

REPLACE - Slave microprocessor (U9)

Table 8-2. Power-On Self Test (Continued)

STEP:

3

TEST:

Slave Microprocessor (U9) Internal and External RAM

FAILURE INDICATION:

VIEW LED flashing - internal RAM failure

VIEW LED on steadily - test stopped

SPEED AND VIEW LED flashing - Servo IC (U13) or SAD bus failure.

CIRCUIT/MECHANICS TESTED:

- Slave Microprocessor (U9); internal RAM
- Servo IC RAM

TROUBLESHOOTING:

IF - VIEW LED Flashes

REPLACE - Slave microprocessor (U9)

IF - VIEW LED on steadily

REPLACE - Slave microprocessor (U9)

IF - SPEED & VIEW LEDs Flashing

CHECK - SAD bus with a logic probe

IF - No bus data

REPLACE - Slave microprocessor (U9)

IF - bus data

REPLACE - Servo IC

STEP:

4

TEST:

Servo IC

FAILURE INDICATION:

VIEW & SPEED LED flashing - Servo IC failure

VIEW & SPEED LED on steadily - test stopped

CIRCUIT/MECHANICS TESTED:

- Servo IC; internal PWMs, encoder feedback, & up/down counters.

TROUBLESHOOTING:

IF - VIEW & SPEED LED Flashes

REPLACE - Servo IC (U13)

IF - VIEW & SPEED LED on steadily

REPLACE - Slave microprocessor (U9) or Servo IC (U13)

Table 8-2. Power-On Self Test (Continued)

STEP:

5

TEST:

Slave (U9) and Master (U6) Microprocessor Handshake

FAILURE INDICATION:

ENTER LED flashing - Handshake failed -
Incorrect data from the master microprocessor
ENTER LED on steadily - handshake failed -
No response from master microprocessor.

CIRCUIT/MECHANICS TESTED:

- Slave microprocessor (U9) port 1
- Master microprocessor (U6) port 1

TROUBLESHOOTING:

IF - ENTER LED Flashes
CHECK - Master microprocessor (U6), master ROM (U14), latch (U7),
data/address lines.
IF - ENTER LED on steadily
CHECK - Master microprocessor (U6) and Slave microprocessor (U9),
master ROM (U14), latch (U7), data/address lines, PSEN & ALE.

STEP:

6

TEST:

Master Microprocessor ROM (U14) Checksum

FAILURE INDICATION:

ENTER & SPEED LED flashing - Master ROM failed
ENTER & SPEED LED on steadily - test stopped

CIRCUIT/MECHANICS TESTED:

- Checksum run on all Master ROM

TROUBLESHOOTING:

IF - ENTER & SPEED LED Flashes
REPLACE - Master ROM (U14)
IF - ENTER & SPEED LED on steadily
CHECK - Master microprocessor (U6), latch (U7), or ROM (U14)

Table 8-2. Power-On Self Test (Continued)

STEP:

7

TEST:

Master Microprocessor (U6) Internal RAM

FAILURE INDICATION:

ENTER & VIEW LED flashing - Master Microprocessor (U6) failure
ENTER & VIEW LED on steadily - test stopped

CIRCUIT/MECHANICS TESTED:

- Reads and writes to and from the internal RAM

TROUBLESHOOTING:

IF - ENTER & VIEW LED Flashes
REPLACE - Master Microprocessor (U6)
IF - ENTER & VIEW LED on steadily
CHECK - Master microprocessor (U6)

STEP:

8

TEST:

Master External RAM

FAILURE INDICATION:

ENTER, VIEW & SPEED LED flashing - External RAM failed
ENTER, VIEW & SPEED LED on steadily - test stopped

CIRCUIT/MECHANICS TESTED:

- Writes and reads to and from all external RAM

TROUBLESHOOTING:

IF - ENTER, VIEW & SPEED LED Flashes
CHECK - Read/Write Lines
REPLACE - External RAM (U10)

Table 8-2. Power-On Self Test (Continued)

STEP:

9

TEST:

Option ROM Checksum (If optional cartridge is installed.)

INDICATION:

ROTATE LED on for approximately 2 seconds indicates that the KANJI ROM is installed.

ROTATE LED flashing - KANJI ROM failed

CIRCUIT/MECHANICS TESTED:

- Performs checksums on all the optional ROM

TROUBLESHOOTING:

IF - ROTATE LED Flashes

REPLACE - Optional KANJI ROM

STEP:

10

TEST:

Initialization

FAILURE INDICATION:

ROTATE & SPEED LED flashing - paper axis servo shutdown

ROTATE & VIEW LED flashing - Pen axis servo shutdown

CIRCUIT/MECHANICS TESTED:

- The plotter mechanics are moved to sense the location of the pen holder and the turret in their respective axes.
- Motor encoders and Servo IC

TROUBLESHOOTING:

IF - ROTATE & SPEED LED Flashes

CHECK - All mechanics in the paper axis, including the pen turret mechanics.

IF - ROTATE & VIEW LED flashing

CHECK - All mechanics in the pen axis.

IF - All mechanics appear to function properly

PERFORM -Servo test procedures listed in this chapter.

8-12. System Verification

8-13. System verification, checking communication between the plotter and the controller, may be accomplished by using the HP-85 Personal Computer, the HP-85 Plotter Service Tape and either the HP-IB or RS-232-C interface. Running the Service Tape will check to see that bi-directional communication has been established between the plotter and the controller. If there is a failure during this program, refer to THE PLOTTER SELF TEST PROCEDURES, recheck the interconnecting cables and the rear panel switch settings on the plotter.

8-14. TROUBLESHOOTING FLOWCHART

8-15. To aid in fault isolation, a troubleshooting flow is included here in Figure 8-2. Always begin with "START" on the first page of the chart and follow the branching references to the successive pages of the flowchart. The reference "A1" returns to the first page of the flowchart, which loops back to retest and verify proper operation of the plotter after any repair has been made.

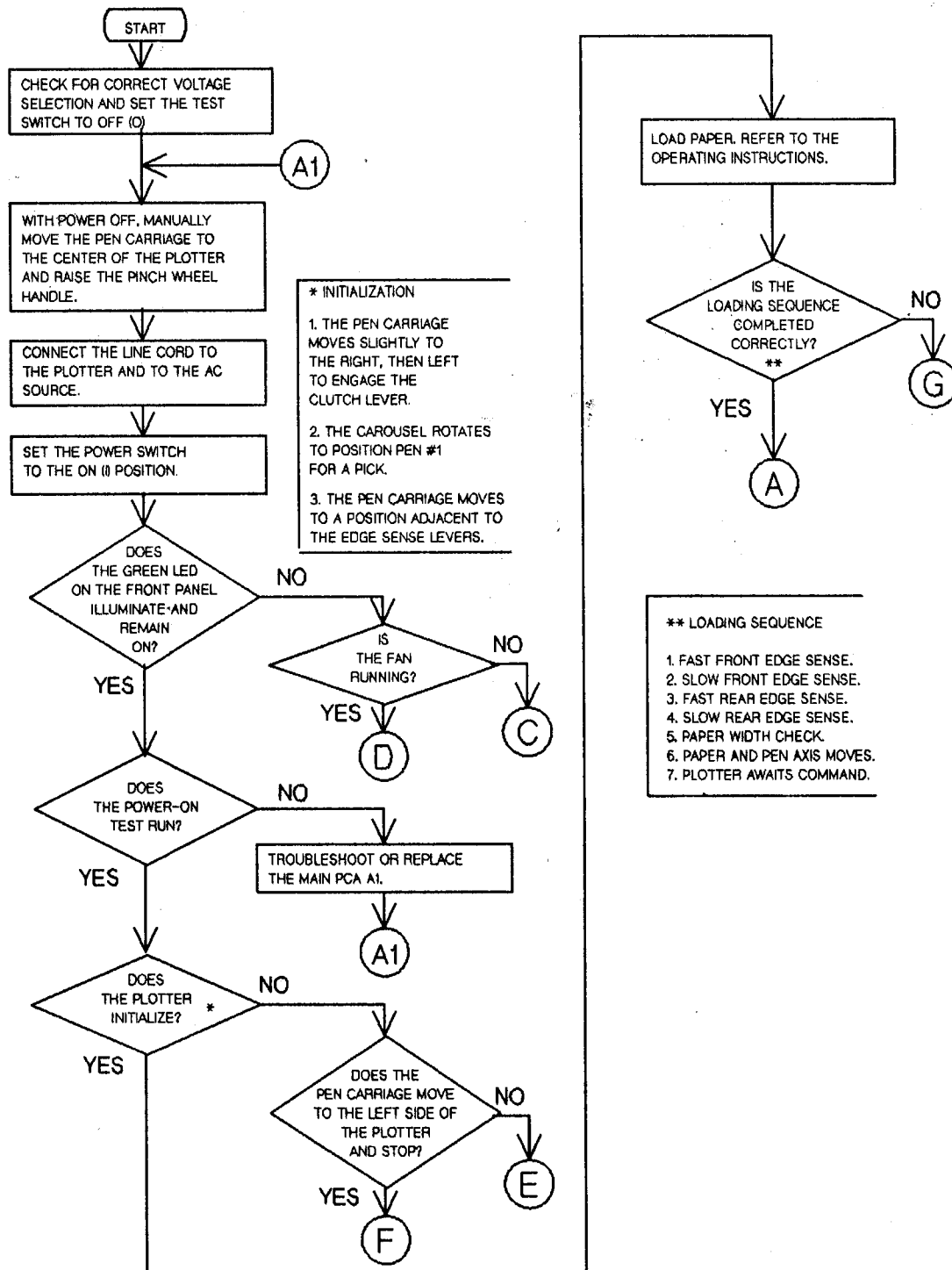


Figure 8-2. Troubleshooting Flowchart (sheet 1 of 7)

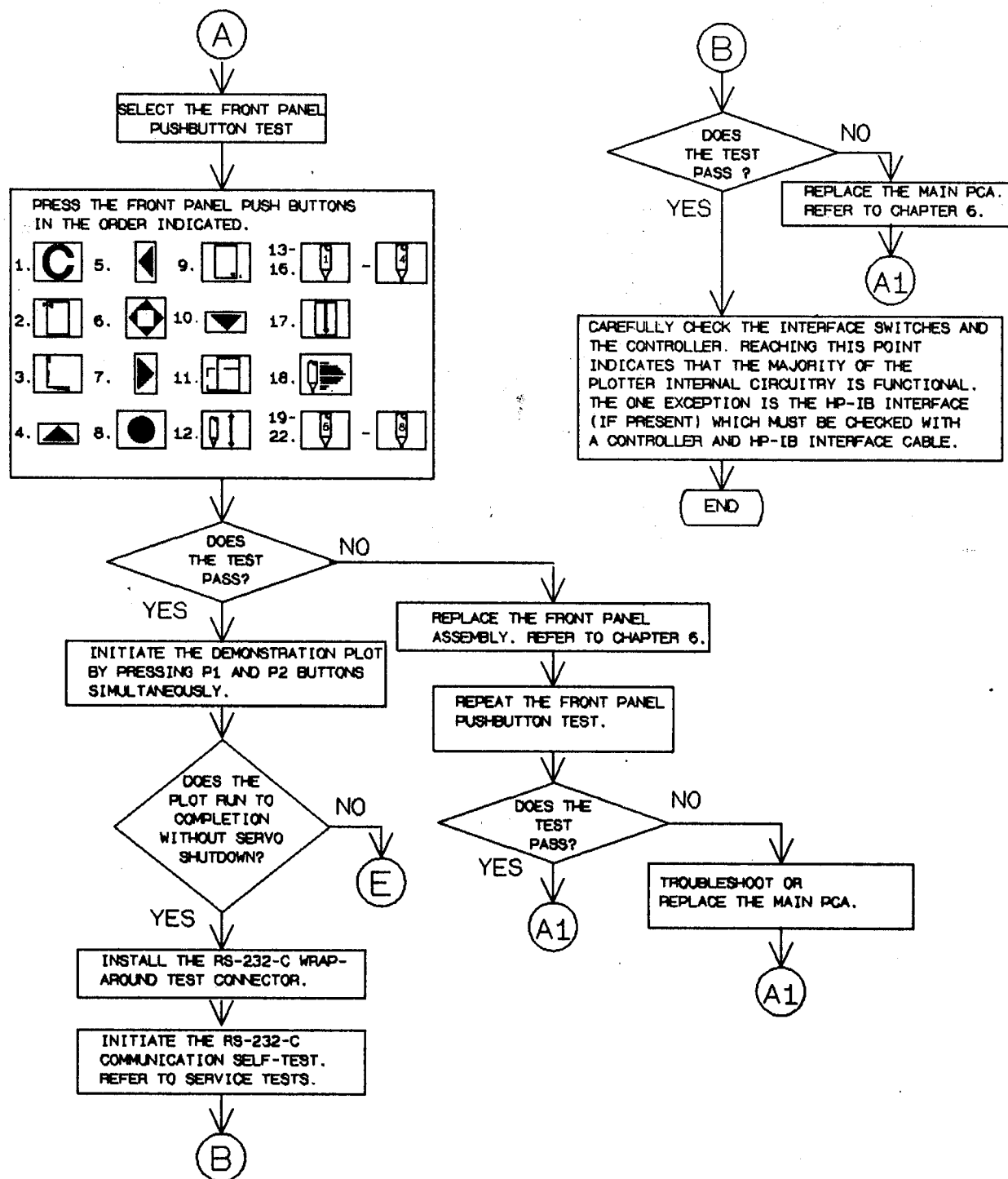


Figure 8-2. Troubleshooting Flowchart (sheet 2 of 7)

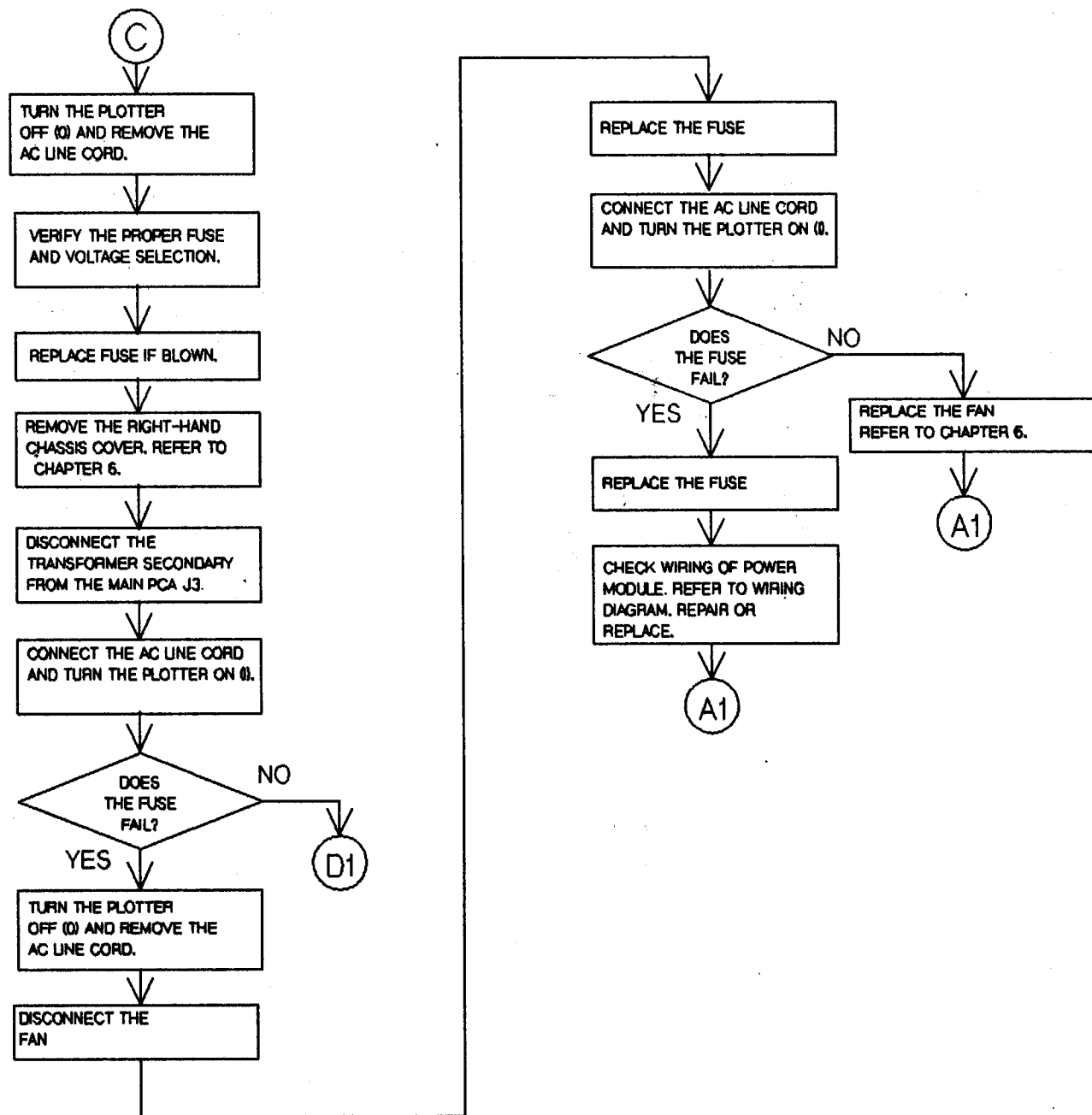


Figure 8-2. Troubleshooting Flowchart (sheet 3 of 7)

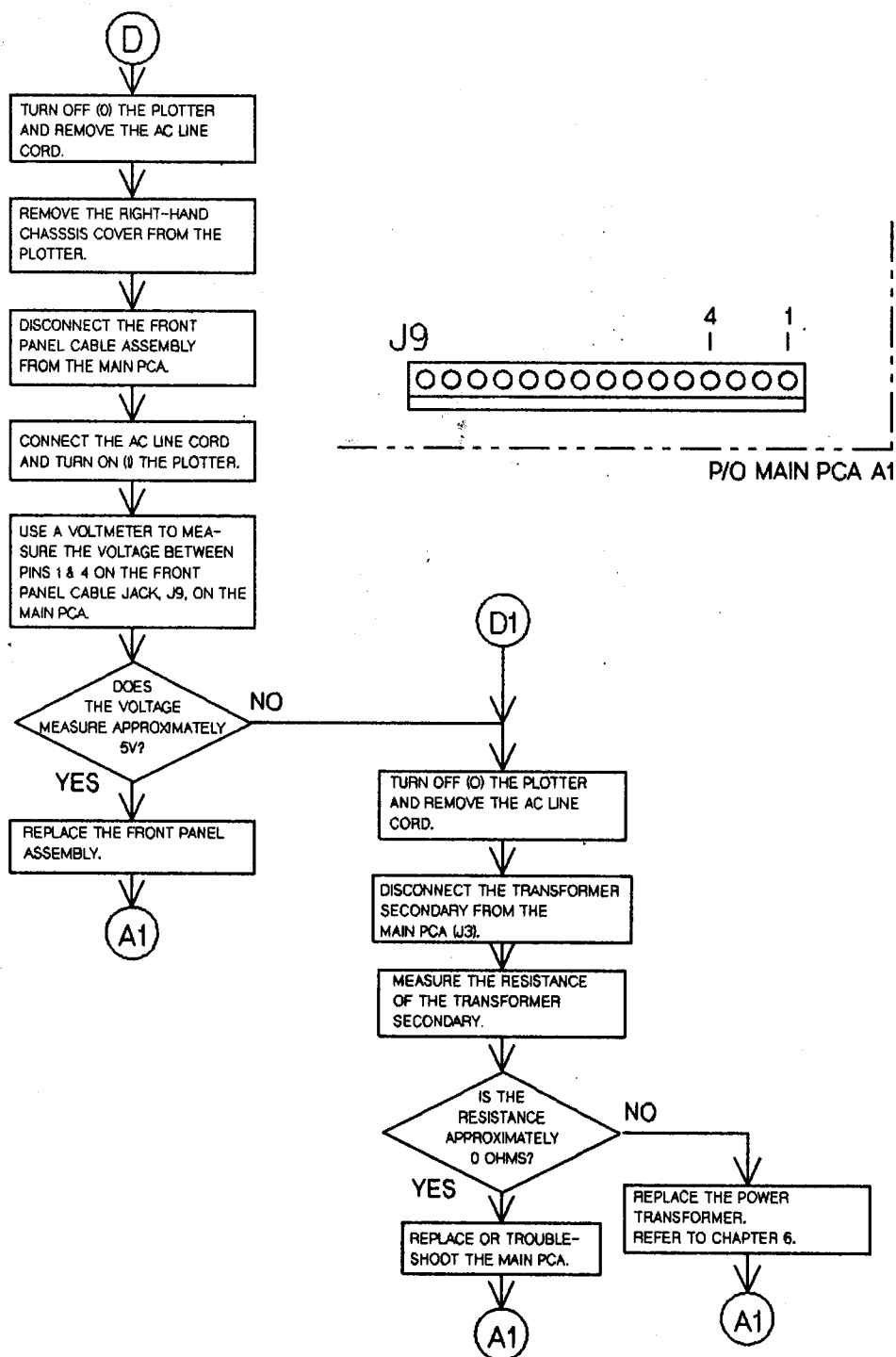


Figure 8-2. Troubleshooting Flowchart (sheet 4 of 7)

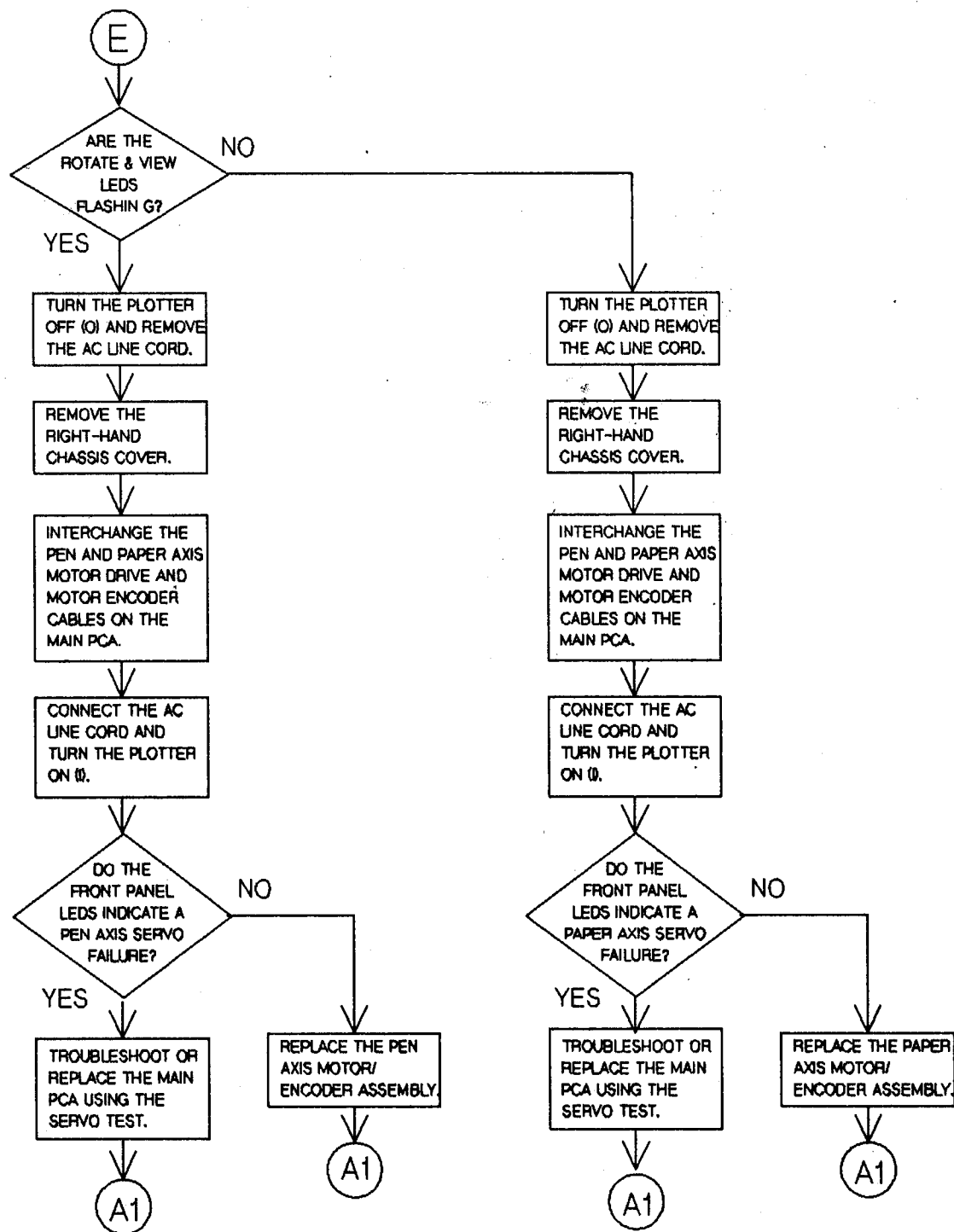


Figure 8-2. Troubleshooting Flowchart (sheet 5 of 7)

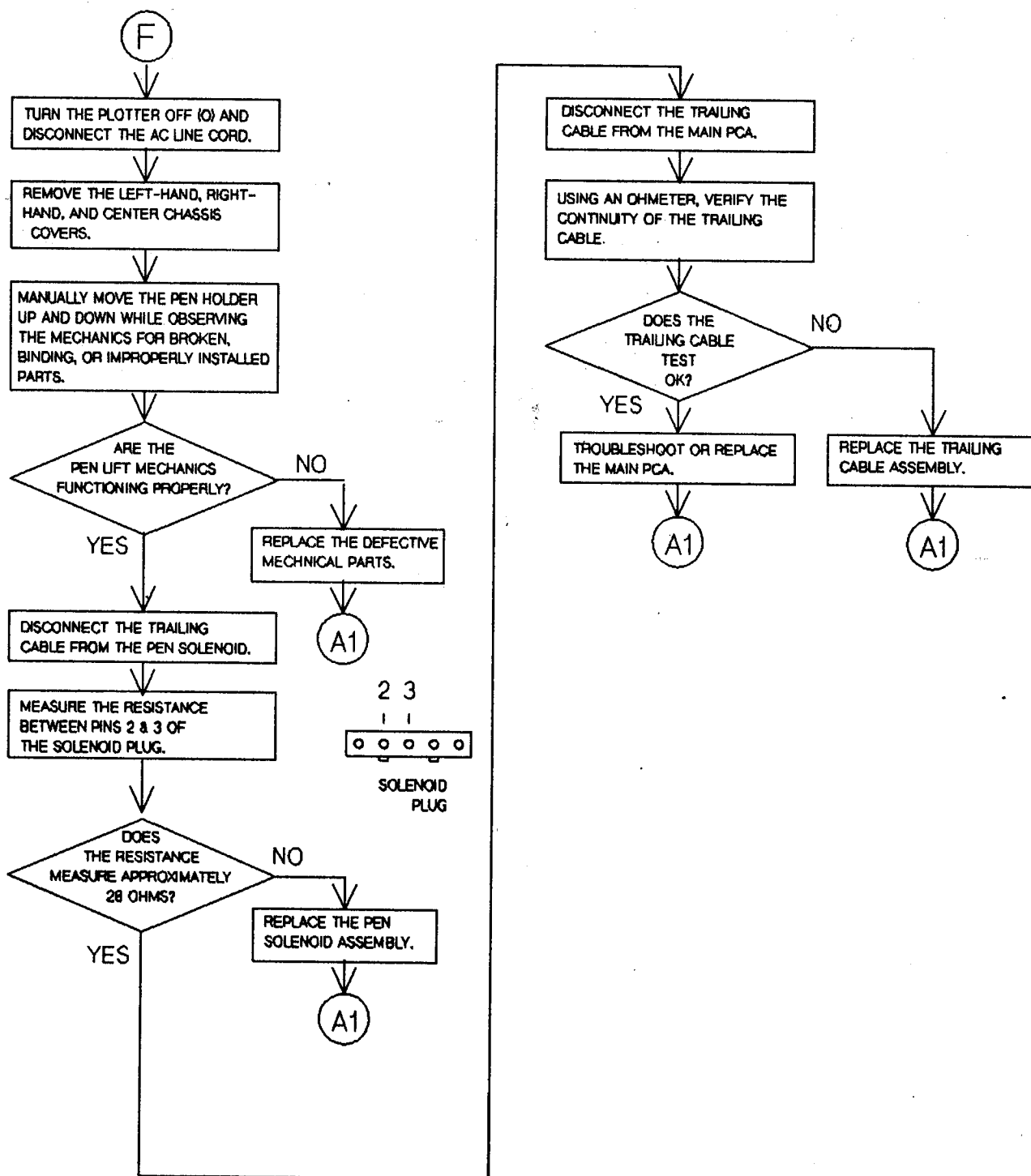


Figure 8-2. Troubleshooting Flowchart (sheet 6 of 7)

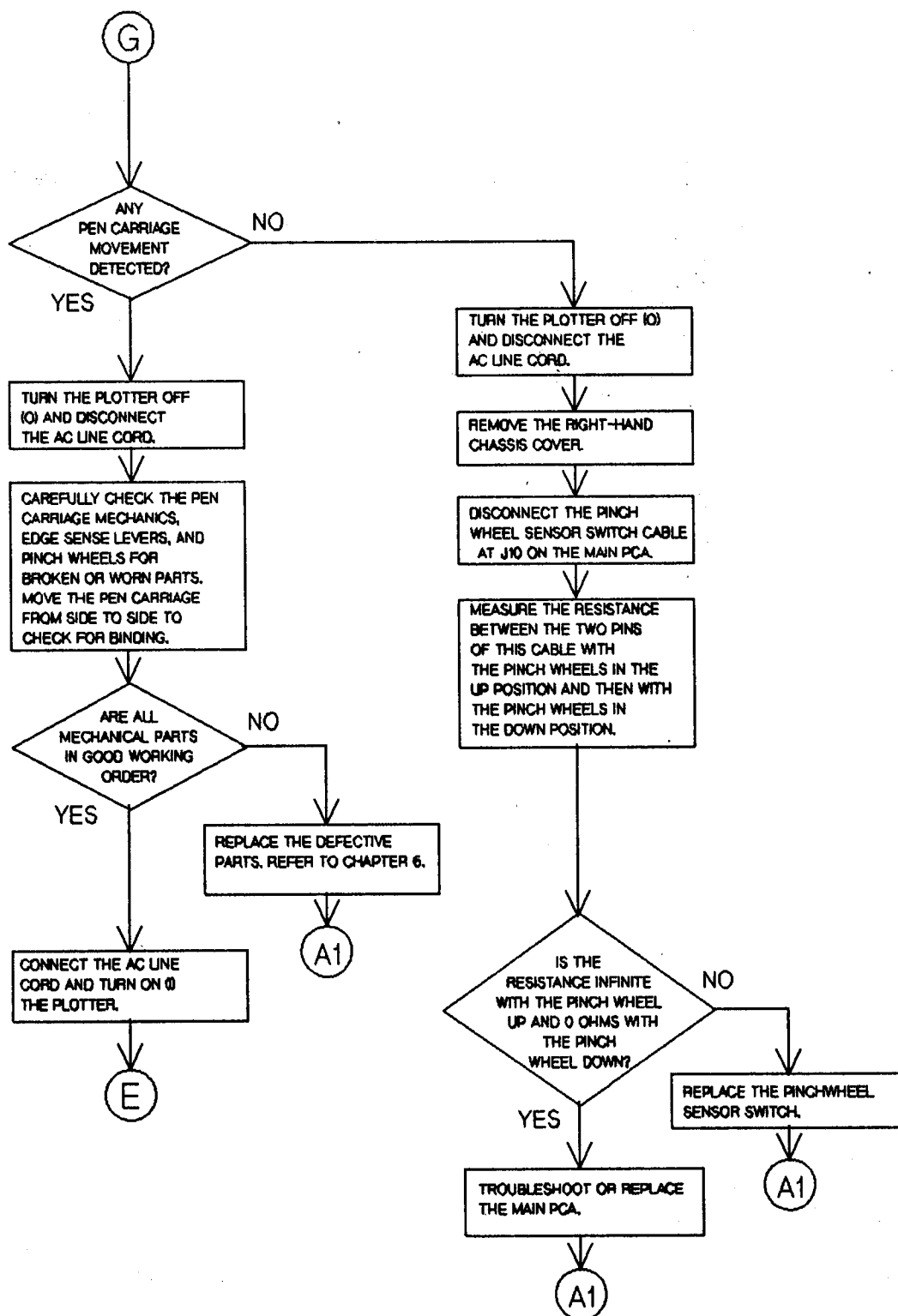


Figure 8-2. Troubleshooting Flowchart (sheet 7 of 7)

8-16. SERVICE TESTS

CAUTION

The following diagnostic tests are intended for use by qualified service trained personnel. Serious damage to the plotter may result if the procedures are not correctly followed.

NOTE

The accuracy and repeatability specifications are valid only when measured on 0.075 mm (0.003 in.) double-matte polyester film at 10 to 30 degrees Celsius.

8-17. The following diagnostics have been built into the plotter to aid in the isolation of faults and replacement of defective parts:

- a. Confidence Test - This is the demonstration plot with an added feature for checking the plotter's accuracy. The plot will be repeated continuously until the plotter is turned off.
- b. I/O Loopback Test - Checks the receivers and transmitters in the RS-232-C interface.
- c. Front Panel Pushbutton Test - Operator interactive test to check the front panel pushbuttons for opens, shorts, or excessive switch bounce.
- d. Servo Test - To evaluate servo circuit performance with an oscilloscope.
- e. Repeatability Test - This test measures the ability of the plotter to return the pen to a specified point. The test is not built in, but must be run on the HP-85 Personal Computer or equivalent controller.

8-18. Confidence Test

8-19. To perform the confidence test, proceed as follows:

- a. Turn OFF (O) the plotter.
- b. Set the rear panel TEST switch (11) to the I (on) position. See Figure 8-3.

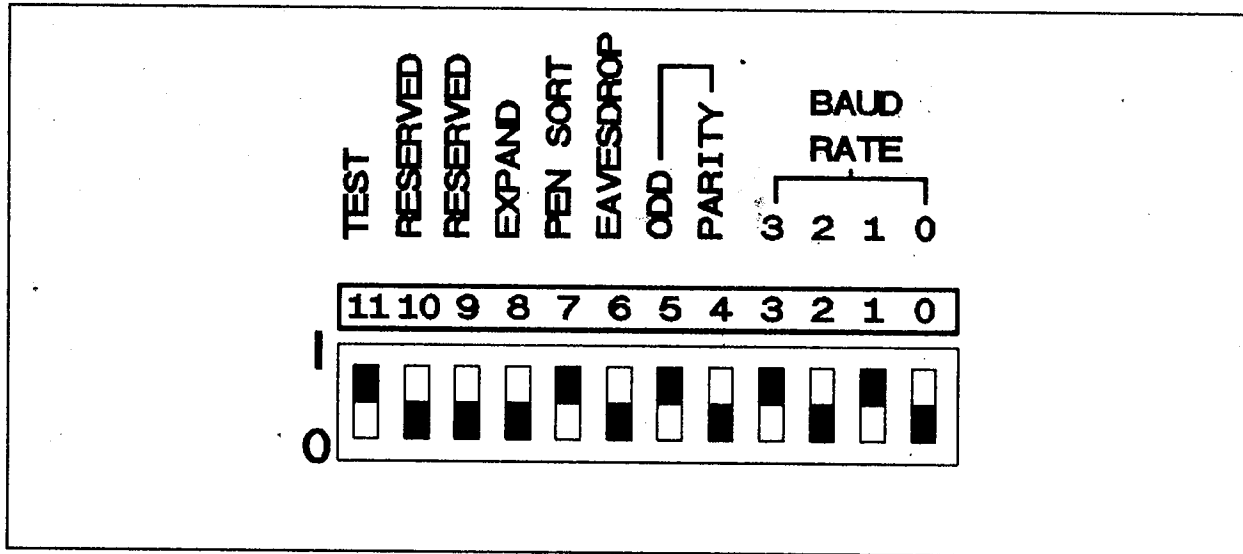


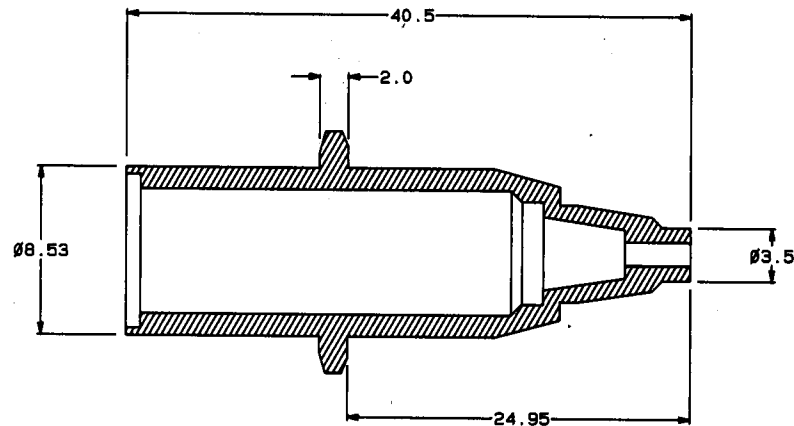
Figure 8-3. Test Switches

- c. Load a sheet of ISO A1 (ANSI D) paper.
- d. Install a pen carousel loaded with new 0.3 mm pens.
- e. Turn ON (I) the plotter.
- f. The plotter will continuously run the confidence test plot, illustrated in Figure 8-4, until the plotter is turned OFF (O).
- g. Turn the plotter OFF (O), and reset the TEST switch (11) to the O (off) position.
- h. Accuracy is checked by measuring the length of the test lines, in the Confidence Test Plot, with a metric scale. The length must be:

Paper-axis 750 mm +/- 1.5 mm
 Pen-axis 450 mm +/- 0.9 mm

DraftPro

The Hewlett-Packard D-Size Drafting Plotter



(Sample Plot)

- * C/D-Size Arch, English, or Metric media
- * Paper, vellum, or polyester media
- * Liquid-ink or fiber-tip pens
- * 8-Pen carousel with pen capping
- * 0.025 mm (0.001 in.) resolution
- * 2g, 40 cm/s (15 in/s)
- * Accuracy of 0.5 mm (0.02 in.) or 0.2%
- * RS-232-C interface

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Figure 8-4. Confidence Test Plot

8-20. I/O Loopback Test

8-21. To perform the I/O Loopback test, proceed as follows:

- a. Turn the plotter OFF (O).
- b. Disconnect the RS-232-C interface cable.
- c. Connect the I/O loopback connector [P/N 07440-60302] to the RS-232-C interface at the rear of the plotter. If no loopback connector is available, specific contacts on the RS-232-C connector may be shorted as shown in Figure 8-5.

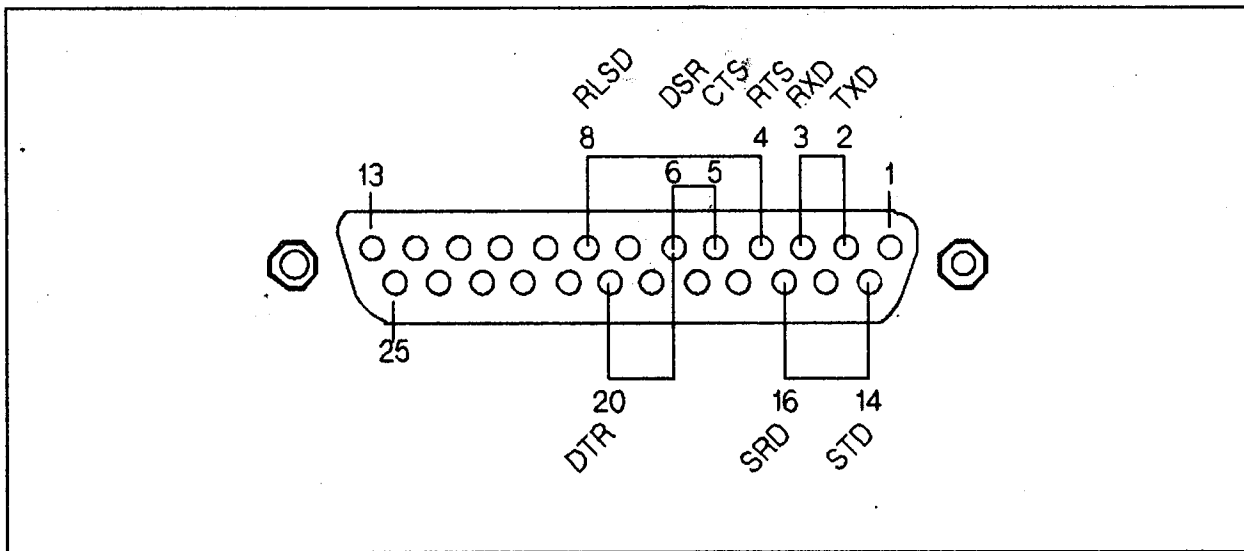


Figure 8-5. Loopback Test

- d. Set the rear panel TEST switch (11) and the RESERVED switch (10) to the I (on) position. See Figure 8-6.

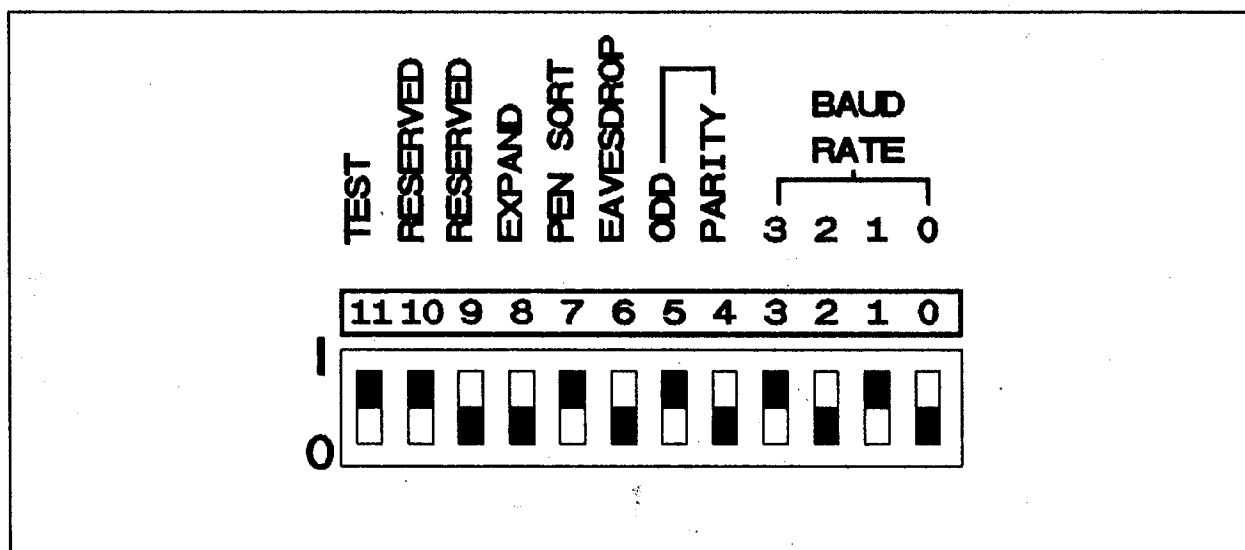


Figure 8-6. I/O Test Switches

- e. Turn ON (I) the plotter.
- f. Proper completion of the test is indicated by the flashing ENTER and SPEED LEDs on the front panel.
- g. The ENTER and SPEED LEDs on steadily indicate no feedback from pin 2 to 3.
- h. The ROTATE and VIEW LEDs flash when an error is detected in the I/O loopback. This may indicate an open from pin 4 to 8, or between 5, 6, & 20. The test periodically loops back to the top of this test loop, allowing time to locate the defective I/O line with an oscilloscope.
- i. Turn OFF (O) the plotter, remove the loopback connector, and reset the test switches (10 & 11) to the O (off) position.

8-22. Front Panel Pushbutton Test

8-23. To perform the front panel pushbutton test, proceed as follows:

- a. Turn the plotter OFF (O).
- b. Set the rear panel TEST switch (11) and the RESERVED switch (9) to the I (on) position. See Figure 8-7.

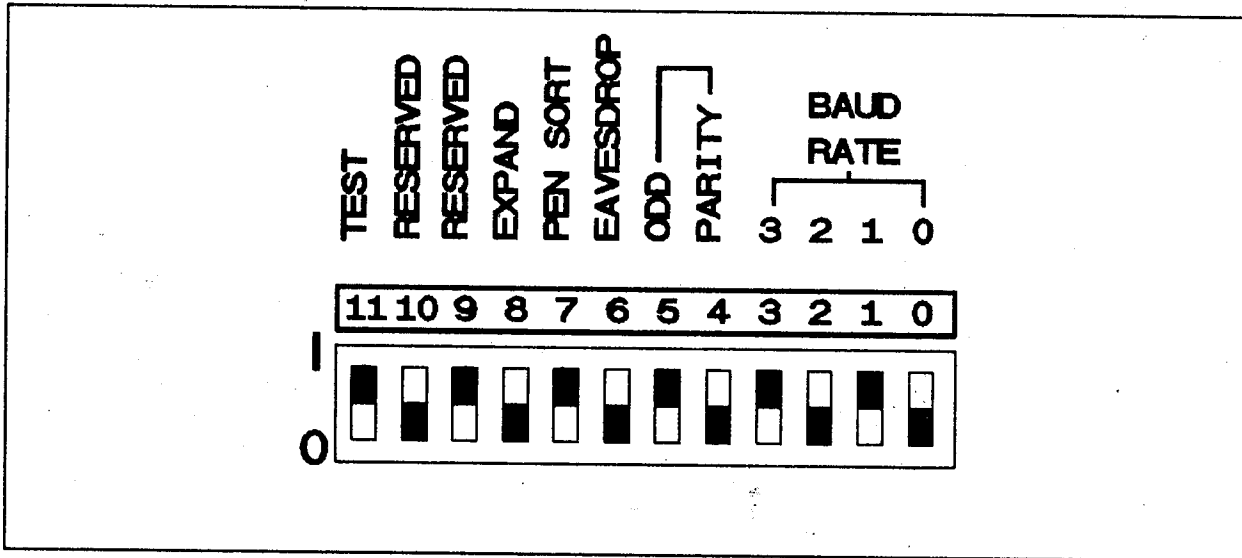


Figure 8-7. Pushbutton Test Switches

- c. Turn the plotter ON (I).
- d. The SPEED LED on the front panel will flash, indicating the start of the test.
- e. Press each front panel pushbutton in the indicated sequence.

- | | | | | | |
|----|--|-----|--|-----|--|
| 1. | | 9. | | 17. | |
| 2. | | 10. | | 18. | |
| 3. | | 11. | | 19. | |
| 4. | | 12. | | 20. | |
| 5. | | 13. | | 21. | |
| 6. | | 14. | | 22. | |
| 7. | | 15. | | | |
| 8. | | 16. | | | |

- f. As each switch passes the test a different LED will light.
- g. An error condition is indicated by all the front panel LEDs flashing.
- h. At the completion of the switch sequence, turn the plotter OFF (O), reset the rear panel switches (9 & 11) to the O (off) position.

8-24. Servo Test

8-25. To perform the servo test, proceed as follows:

- a. Turn the plotter OFF (O).
- b. Remove the right hand chassis cover. If necessary refer to the procedures in Chapter 6.
- c. Center the pen carriage on the platen to allow movement in either direction.
- d. Disconnect the Paper- and Pen-axis motor cable assemblies from the main PCA, Jacks J5 and J6. See Figure 8-8.

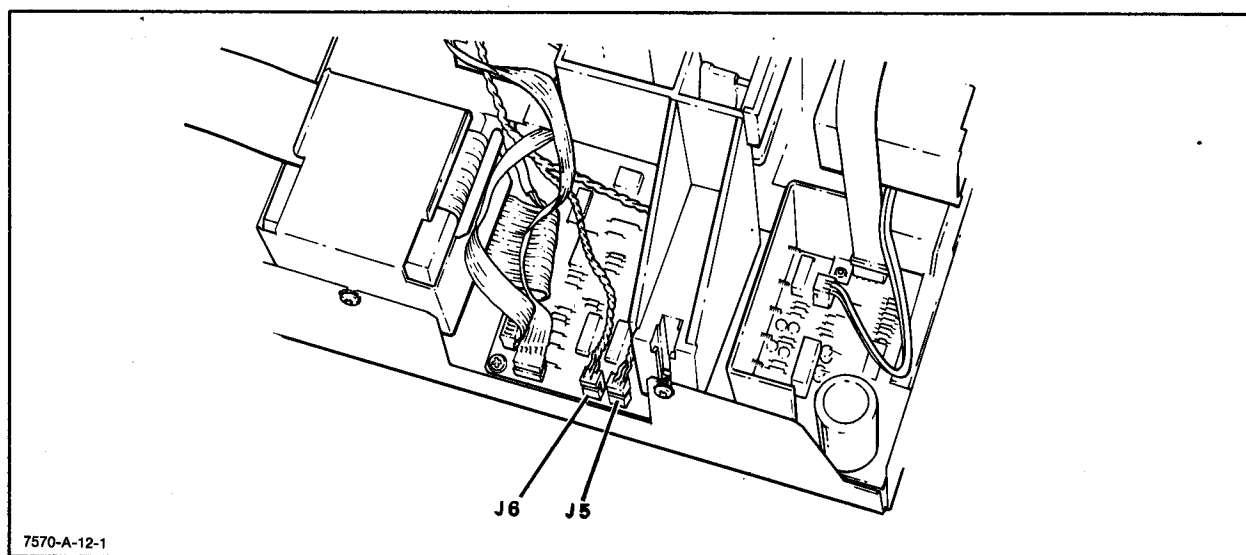


Figure 8-8. PCA Cable Connections

- e. Set the rear panel TEST switch (11) and both RESERVED switches (9 & 10) to the I (on) position. See Figure 8-9.

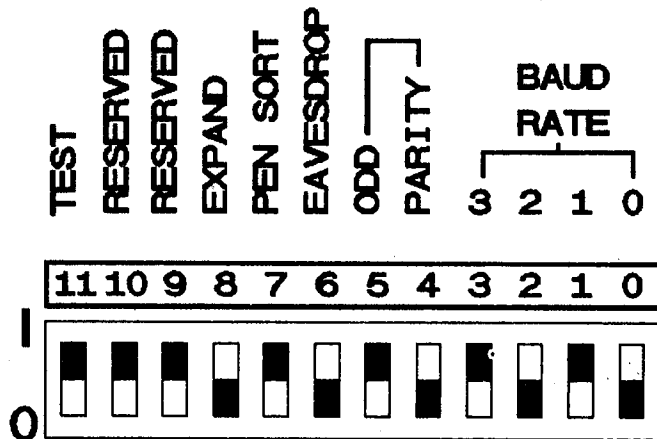
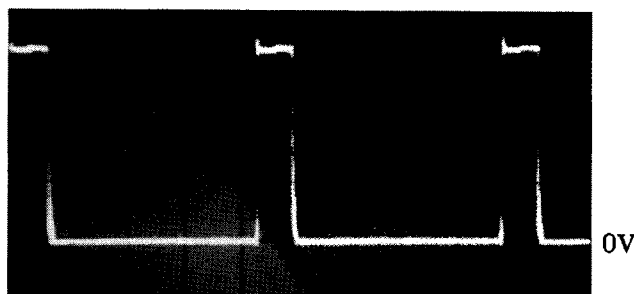


Figure 8-9. Servo Test Switches

- f. Press and hold the ENTER and UP cursor pushbuttons while turning the plotter ON (I). Hold the buttons down until the power-on self test is completed.
- g. Connect the oscilloscope probe to the jack pins on the PCA to monitor the signal as the appropriate front panel cursor pushbutton is pressed.

J5-1 UP
 J5-2 DOWN
 J6-1 LEFT
 J6-2 RIGHT

- h. Each drive signal should appear similar to the waveform in Figure 8-10.



10:1 PROBE
 1V/DIV
 10 μ s/DIV
 INT(+) SYNC

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Figure 8-10. Motor Drive Output

- i. Connect the pen and paper-axis motor cables to the jacks on the main PCA.

NOTE

Leave the encoder cables connected to the PCA jacks to monitor the signal.

- j. Monitor the output of the motor encoders with the oscilloscope at pins 3 and 5 of J7 on the main PCA while pressing either the UP or DOWN cursor pushbutton. The waveform should appear similar to Figure 8-11.
- k. Monitor the output of the motor encoders with the oscilloscope at pins 3 and 5 of J8 on the main PCA while pressing either the LEFT or RIGHT cursor pushbutton. The waveforms should appear similar to Figure 8-11.
- l. Turn OFF (O) the plotter, return the test switches to the OFF (O) position, and replace the chassis cover.

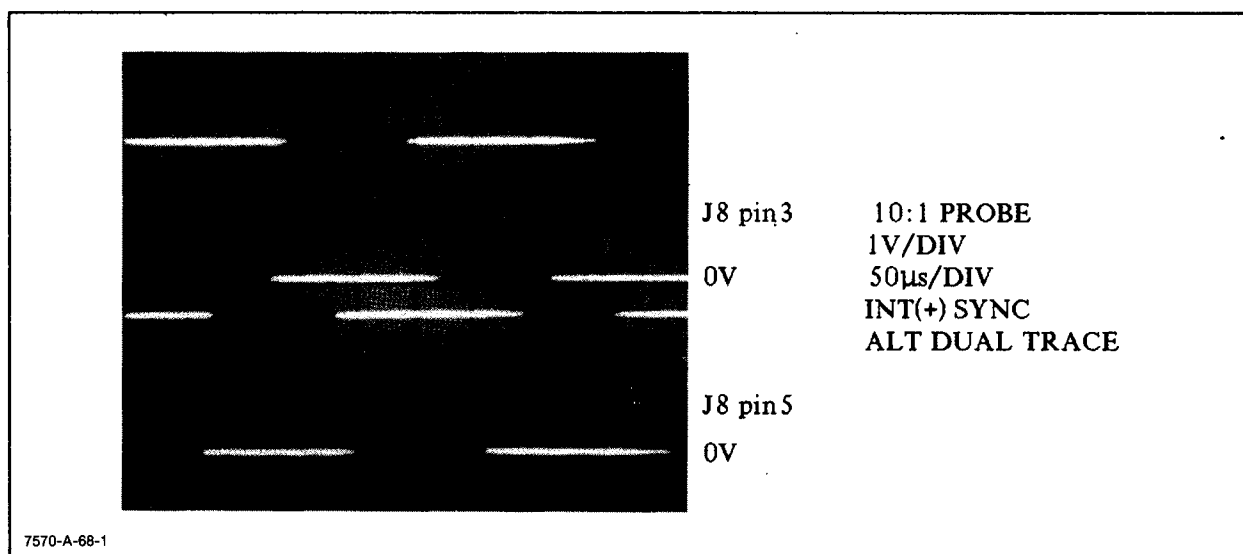


Figure 8-11. Motor Encoder Output

8-26. Repeatability Test

8-27. To perform the repeatability test, proceed as follows:

NOTE

The HP-85 Personal Computer is required for this test.

- a. Turn OFF (O) the plotter and the HP-85.
- b. Connect the plotter to the HP-85 using either the HP-IB or RS-232-C interface. Set the plotter rear panel switches as follows:
 - HP-IB Address - 05
 - RS-232-C - baud 2400 - parity - even - none
- c. Turn on the plotter and the HP-85.
- d. Enter the program listing given in Figure 8-12 into the HP-85. Note that program lines with an exclamation point (!) are only commentary, and may be omitted.
- e. Load a sheet of either ISO A2 (ANSI C) or A1 (ANSI D) paper.
- f. Install a new 0.3 mm pen in position 1 of the carousel.
- g. Install the carousel in the plotter.
- h. Run the repeatability test program. The resulting plot is shown in Figure 8-13.

```

10 |
20 | HP DRAFTPRO REPEATABILITY TEST
30 |
40 | (AUGUST 1, 1985)
50 |
60 |
70 | SELECT ADDRESS FOR PLOTTER INTERFACE
80 |
90 CLEAR
100 DISP "ENTER ADDRESS"
110 DISP
120 DISP " eg. RS-232-C '10'"
130 DISP " eg. HP-IB '705'"
140 DISP
150 INPUT N
160 DISP "ADDRESS IS";N
170 IF N<99 THEN GOSUB 370
180 |
190 | SET GRIT TRACKS IN PAPER
200 |
210 OUTPUT N ; "INSP00P"
220 ENTER N ; X1,Y1,X2,Y2
230 FOR V=5 TO 25 STEP 10
240 OUTPUT N ; "VS";V;"PD";X1;"",Y1;"",X2;"",Y2
250 NEXT V
260 |
270 | DRAW VECTORS AND CIRCLE INTERSECTIONS
280 |
290 OUTPUT N ; "PUSP1PA";X1;"",0PD";X1;"",Y1;"",0,";Y1;"PUCI150"
300 OUTPUT N ; "PA0,";Y2;"PD";X2;"",Y2;"",X2;"",0PUCI150"
310 OUTPUT N ; "PA";X1;"",0CI150PD";X1;"",Y2;"",0,";Y2;"PUCI150"
320 OUTPUT N ; "PA0,";Y1;"PD";X2;"",Y1;"",X2;"",0PU"
330 OUTPUT N ; "PA";X1;"",Y2;"PD0,0PU";X2;"",Y1;"PD0,0PUCI150"
340 OUTPUT N ; "PU6000,5000DI0,-1LBHP DRAFTPRO REPEATABILITY TEST";CHR$(3)
350 OUTPUT N ; "SP0NR"
360 END
370 |
380 | HP 85 RS-232-C SET-UP
390 |
400 CONTROL N,1 ; 16 | RECEIVED DATA GENERATES INTERRUPT
410 CONTROL N,2 ; 5 | ACTIVATES DTR & CTS
420 CONTROL N,3 ; 11 | SET BAUD RATE TO 2400
430 CONTROL N,4 ; 3 | 8 BITS/WORD WITH NO PARITY
440 CONTROL N,5 ; 16 | ENABLES HARDWARE HANDSHAKE
450 CONTROL N,16 ; 0 | NO CHARACTERS SENT AT EOL
460 |
470 | TURN-ON & CONFIGURATION
480 |
490 OUTPUT N ; CHR$(27)&".( " | TURN PLOTTER ON
500 OUTPUT N ; CHR$(27)&".@;15:" | SET HARDWARE HANDSHAKE
510 OUTPUT N ; CHR$(27)&"M50;;;13;10:" | SET OUTPUT MODE
520 RETURN

```

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Figure 8-12. Repeatability Test Program Listing

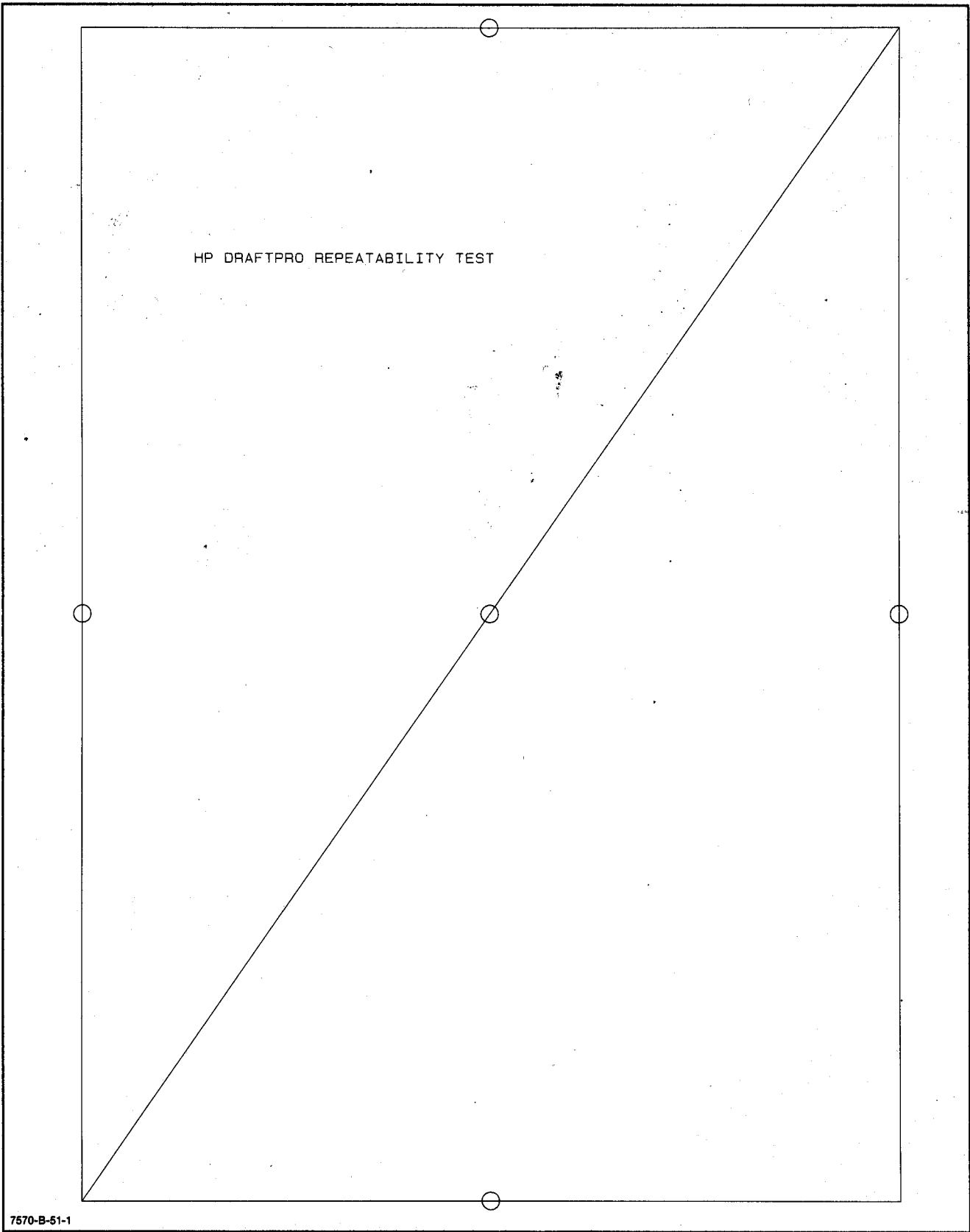


Figure 8-13. Repeatability Test Plot

- i. Remove the completed test plot for examination.
- j. Using an optical comparator, examine each of the five vector intersect points. These points are indicated by the small circles on the plot.
- k. The end points must match within 100 micrometres (0.004 in.) for single pen repeatability.
- l. To test pen-to-pen repeatability, the program may be interrupted by pressing the VIEW pushbutton on the front panel.
- m. While the program is stopped, manually change the plotter pen with another new 0.3 mm pen of a different color.
- n. Press the VIEW pushbutton again to resume plotting.
- o. When the plot is complete, examine the pen-to-pen vector intersects.
- p. The end points must match within 200 micrometres (0.008 in.) for the pen-to-pen repeatability.
- q. Turn off the plotter and the HP-85 before disconnecting the interface cable.

8-28. TROUBLESHOOTING WAVEFORMS

8-29. The following waveforms, Figures 8-14 and 8-18, will be helpful in isolating problems on the printed circuit assembly.

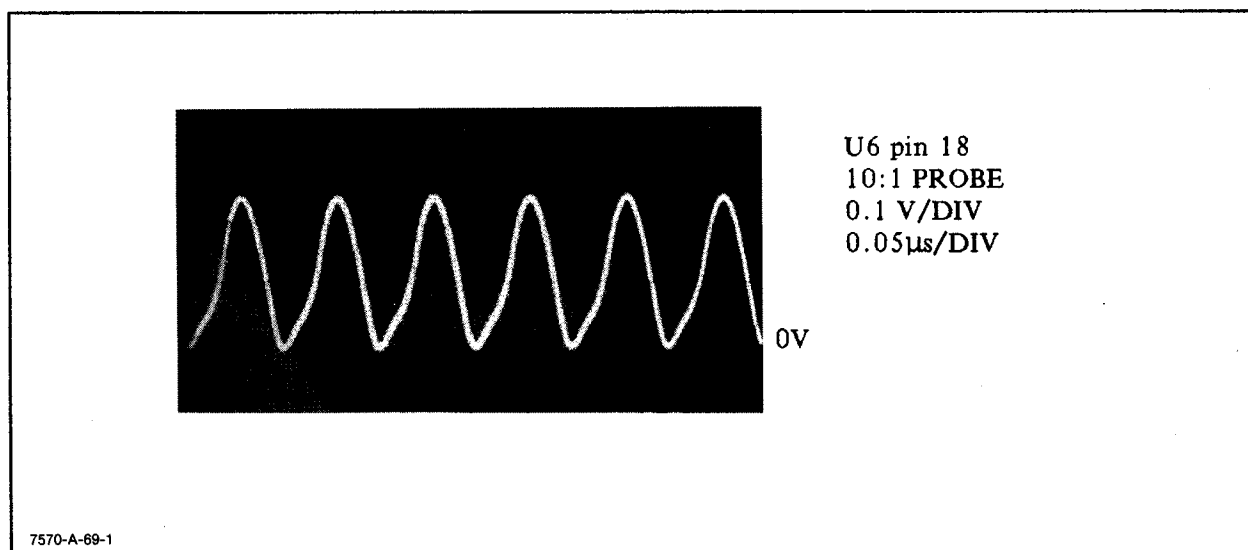


Figure 8-14. Master Clock Output

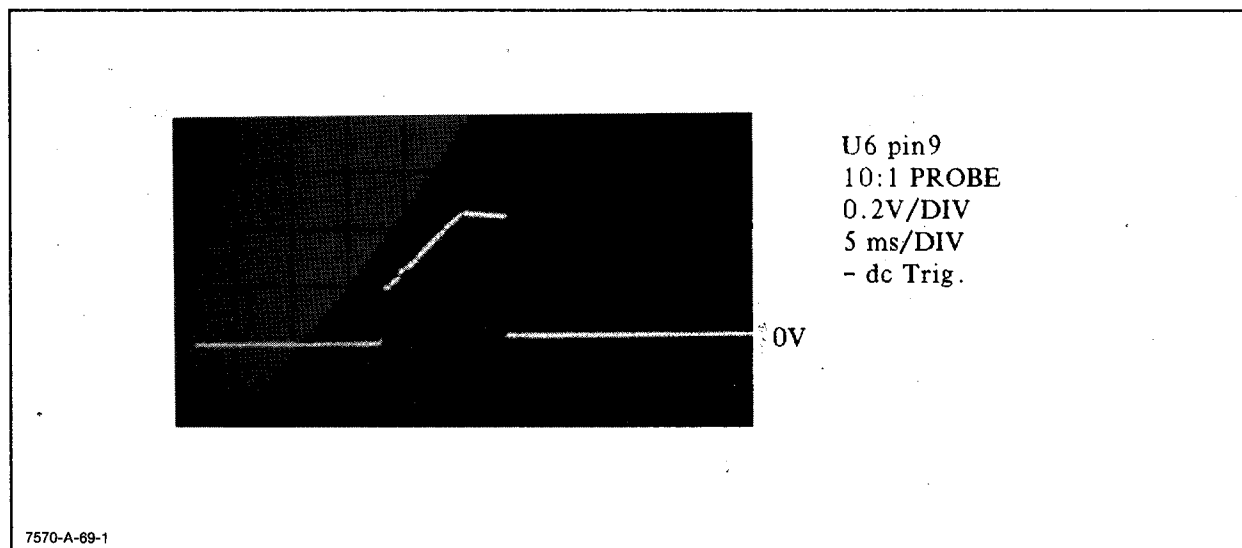


Figure 8-15. Reset Waveform

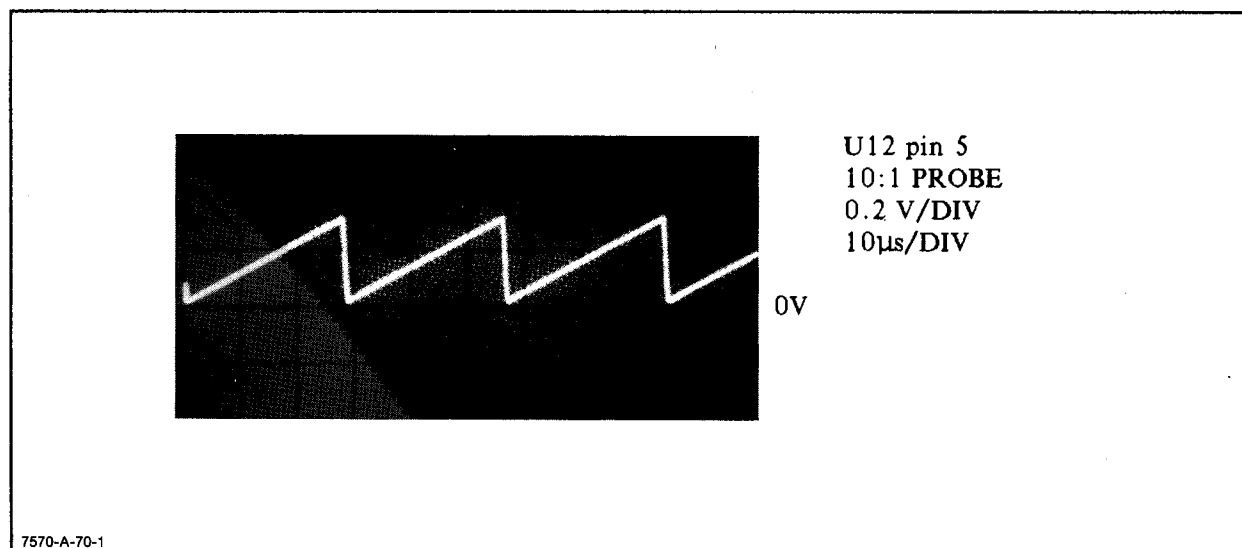


Figure 8-16. PWM Sawtooth Waveform

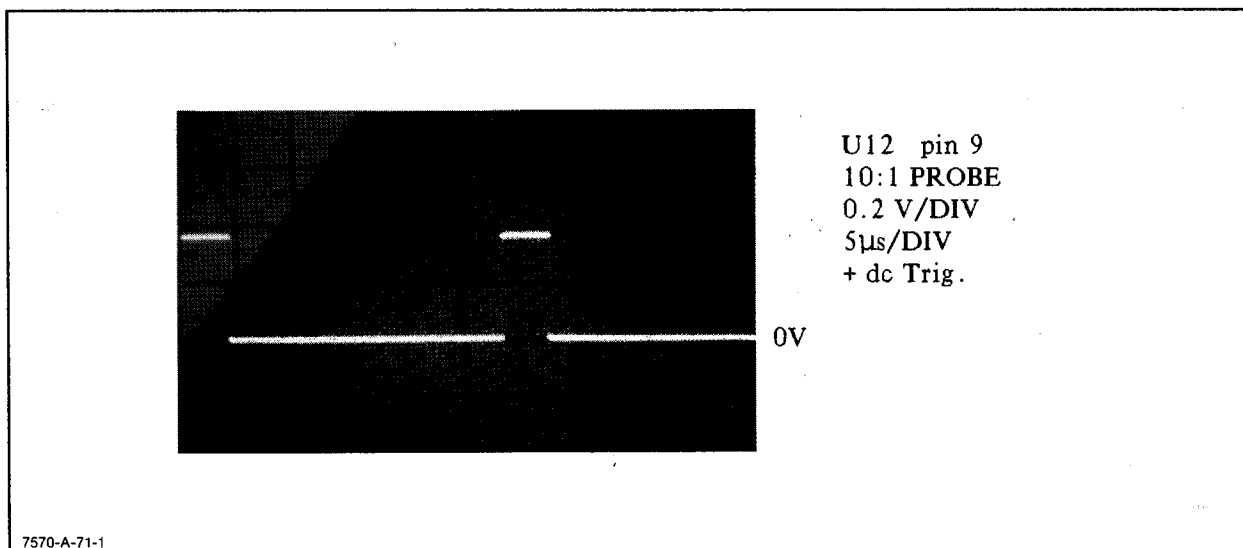


Figure 8-17. U12 Pulse Width Modulation Output

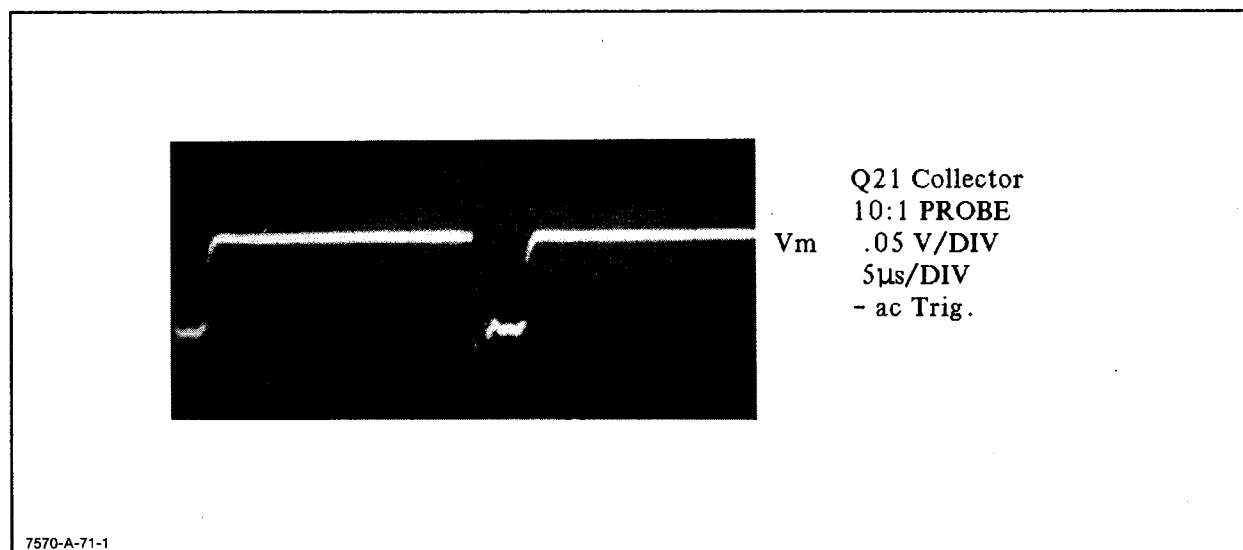


Figure 8-18. Q21 Collector Waveform

9-1. INTRODUCTION

9-2. This section contains information for ordering parts for the HP 7570. Included are lists of electrical and mechanical parts.

9-3. ORDERING INFORMATION

9-4. To obtain replacement parts or assemblies address an order or inquiry to the nearest Hewlett-Packard Sales and Support Office. Include the HP Part Number, the check digit (listed under the heading "CD" in the parts list), the description, and the quantity required.

9-5. ILLUSTRATED PARTS BREAKOUTS

9-6. Mechanical parts for the HP 7570 plotter are listed in Tables 9-1 through 9-6. The assemblies are illustrated in Figures 12-1 through 12-6.

9-7. FIELD REPLACEABLE PARTS

9-8. Components for the plotter main PCA are listed in Table 9-7. Components for the optional HP-IB PCA are listed in Table 9-8 and Table 9-9. Schematics and component location diagrams are found in Chapter 12 of this manual.

9-9. REFERENCE DESIGNATIONS AND ABBREVIATIONS

9-10. Table 9-10 lists designators and abbreviations used throughout this manual. Abbreviations in the parts lists are always capital letters. In other parts of the manual both upper and lower case abbreviations are used.

9-11. CODE LIST OF MANUFACTURERS

9-12. Table 9-11 lists the five-digit code numbers assigned to the manufacturers of parts in the HP 7570. These code numbers appear with the parts in Tables 9-1 through 9-9 as an aid for ordering replacement parts directly from the manufacturer.

Table 9-1. Parts List, Covers and Chassis Assemblies

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0515-1722	8	10	SCREW-MACHINE ASSEMBLY M4 X 0.7 14MM-LG	28480	0515-1722
2	07570-60024	3	1	COVER, LEFT	28480	07570-60024
3	07570-40118	2	26	RIB, LONG	28480	07570-40118
4	07570-40119	5	1	INSERT, REAR	28480	07570-40119
5	07570-00050	9	1	PLATEN, REAR	28480	07570-00050
6	0515-1472	5	4	SCREW-THD RLG ASSY M5 X 1.81 19MM-LG	28480	0515-1472
7	07570-00091	8	1	COVER, CENTER	28480	07570-00091
8	0624-0684	0	2	SCREW, PLASTITE	28480	0624-0684
9	07090-20020	4	1	WASHER, SHOULDER	28480	07090-20020
10	07570-60029	8	1	COVER, RIGHT	28480	07570-60029
11	3050-0816	6	1	WASHER, FLAT	28480	3050-0816
12	07570-60220	1	1	FRONT PANEL ASSY	28480	07570-60220
13	07570-60025	4	1	CABLE ASSY, FRONT PANEL	28480	07570-60025
14	07570-40017	2	2	RIB, SHORT	28480	07570-40017
15	07570-00045	2	1	PLATEN, FRONT	28480	07570-00045
16	07570-40118	4	1	INSERT, FRONT	28480	07570-40118
17	07570-60115	3	2	DISSIPATOR, STATIC	28480	07570-60115
18	07570-00055	4	2	SHIELD, DISSIPATOR	28480	07570-00055
19	1460-2137	5	2	SPRING-EXT 6.5-MM-OD SST	28480	1460-2137
20	07570-00024	7	2	BRIDGE	28480	07570-00024
21	07570-00025	8	4	PAD, ISOLATION	28480	07570-00025
22	07570-20160	4	4	NUT-HEX M6 X 1 3.5MM-THK 10.3MM-A/F	28480	07570-20160
23	07570-60013	0	1	KIT, HARDWARE	28480	07570-60013
24	07570-60015	2	1	STAND	28480	07570-60015
25	07570-60014	1	2	FOOT	28480	07570-60014
26	0460-1927	8	1	TAPE, RUBBER	28480	0460-1927
27	07570-00017	8	1	SHIELD, LEFT	28480	07570-00017
28	0515-1597	5	1	SCREW MAX.7 14MM-LG	28480	0515-1597
29	07570-00042	9	1	PAD, BOTTOM	28480	07570-00042
30	07570-00043	0	1	PAD, BACK	28480	07570-00043
31	07570-00044	1	1	PAD, TOP	28480	07570-00044

Table 9-2. Parts List, Left-Hand Chassis

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0624-0684	0	1	SCREW, PLASTITE	28480	0624-0684
2	07570-40021	8	1	SHIELD, CAROUSEL	28480	07570-40021
3	07570-40050	3	1	TURNTABLE, CAROUSEL	28480	07570-40050
4	0624-0684	0	1	SCREW, PLASTITE	28480	0624-0684
5	07570-20031	8	1	MOUNT, CAROUSEL	28480	07570-20031
6	07570-40060	5	1	LEVER, ENGAGING	28480	07570-40060
7	1460-2134	2	3	SPRING-EXT 4.8-MM-OD 28.6-MM-0A-LG SST	28480	1460-2134
8	07570-40070	7	1	SHAFT, CLUTCH	28480	07570-40070
9	07570-40016	1	1	GEAR, WORM	28480	07570-40016
10	0515-1472	5	1	SCREW-THD RLG ASSY M5 X 1.81 19MM-LG	28480	0515-1472
11	07570-40165	1	1	SENSOR, EDGE-REAR	28480	07570-40165
12	07570-40095	6	1	SENSOR, EDGE-FRONT	28480	07570-40095
13	1460-2129	5	2	SPRING-EXT 4.8-MM-OD MUW ZN	28480	1460-2129
14	07570-40065	0	1	CLAMP, BEARING	28480	07570-40065
15	07580-60099	4	1	PINCHWHEEL ASSY	28480	07580-60099
16	07570-20035	2	1	SHAFT, PINCHWHEEL	28480	07570-20035
17	0905-1092	2	1	O-RING .07-IN-ID .07-IN-XSECT-DIA NTRL	83259	2-004N103-70
18	0510-0015	0	2	RETAINER-RING E-R EXT .125-IN-DIA STL	28480	0510-0015
19	07570-20045	4	1	SHAFT, PINCHWHEEL ARM	28480	07570-20045
20	07570-40200	5	1	ARM, PINCHWHEEL	28480	07570-40200
21	1460-2135	3	2	SPRING-EXT 11.1-MM-OD 60-MM-0A-LG MUW ZN	28480	1460-2135
22	07570-40185	5	2	STOP, PAPER	28480	07570-40185
23	07570-40160	8	1	LEVER, PAPER STOP FRONT	28480	07570-40160
24	07570-40180	0	1	HANDLE, PW SHAFT	28480	07570-40180
25	07570-40036	5	1	COUPLER	28480	07570-40036
26	07570-40090	1	1	CAM, PINCHWHEEL	28480	07570-40090
27	0535-0095	8	3	NUT-SQUARE NO-CHAM M4 X 0.7 3.2MM-THK	28480	0535-0095
28	07570-40175	3	1	LEVER, PAPER STOP REAR	28480	07570-40175
29	0515-1722	8	4	SCREW-MACHINE ASSEMBLY M4 X 0.7 14MM-LG	28480	0515-1722
30	07570-00010	1	1	BASE, LEFT	28480	07570-00010
31	07570-20011	4	1	CHASSIS, LEFT	28480	07570-20011
32	1460-2139	7	1	SPRING, MAIN TENSIONER	28480	1460-2139
33	07570-40105	9	1	TENSIONER, MAIN	28480	07570-40105
34	07570-60105	1	1	IDLER ASSEMBLY, MAIN	28480	07570-60105
35	1500-0684	8	1	BELT-GEAR .512-IN-WD .046-IN-THK	28480	1500-0684
36	07570-00012	3	1	SHIELD	28480	07570-00012

Table 9-3. Parts List, Center Chassis

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07570-60005	0	1	CABLE ASSEMBLY, TRAILING	28480	07570-60005
2	07570-60020	9	1	SOLENOID ASSY INCLUDES PLUNGER	28480	07570-60020
3	0515-0733	9	1	SCREW	28480	0515-0733
4	07570-40146	8	1	PAD, UPPER	28480	07570-40146
5	1460-2127	3	1	SPRING-CPRSN 12-MM-OD 10.7-MM-0A-LG SST	28480	1460-2127
6	07570-40145	7	1	PAD, LOWER	28480	07570-40145
7	07570-60020	3	1	PEN CARRIAGE ASSY	28480	07570-60020
8	1520-0255	2	1	DAMPER	28480	1520-0255
9	1460-2136	4	1	SPRING-EXT 5-MM-OD 25-MM-0A-LG SST	28480	1460-2136
10	1460-2125	1	1	SPRING-EXT 3.5-MM-OD SST	28480	1460-2125
11	1460-2126	2	1	SPRING-EXT 3.5-MM-OD SST	28480	1460-2126
12	07570-00035	0	4	CLIP, PLATEN	28480	07570-00035
13	07570-20105	7	2	ROD, SLIDER	28480	07570-20105
14	1500-0684	9	1	BELT-GEAR .512-IN-WD .046-IN-THK	28480	1500-0684
15	0515-1743	3	1	SCREW, TAPTITE	28480	0515-1743
16	07570-40245	8	1	PLATEN, CENTER	28480	07570-40245
17	07570-60085	6	1	GRIT WHEEL SHAFT ASSY	28480	07570-60085
18	07570-00027	0	1	CLAMP, ROD	28480	07570-00027
19	07570-40195	7	2	GASKET, CHASSIS	28480	07570-40195
20	07570-20015	8	1	BAR, DATUM	28480	07570-20015
21	07670-00106	6	1	PAN	28480	07670-00106
22	07570-40090	1	2	CAM PINCHWHEEL ARM	28480	07570-40090
23	07570-20030	7	1	BAR PINCHWHEEL	28480	07570-20030
24	0624-0684	0	4	SCREW PLASTITE	28480	0624-0684
25	3160-0499	4	1	FAN-TBAX 35-CFM 115V 50	28480	3160-0499
26	9100-4617	6	1	TRANSFORMER	28480	9100-4617
27	07570-40197	9	1	GASKET, FAN	28480	07570-40197
28	07570-40196	8	1	GASKET, MODULE	28480	07570-40196
29	0535-0043	6	6	NUT-HEX W/LKWR M4 X 0.7 3.2MM-THK	28480	0535-0043
30	07570-40045	6	1	MODULE, FAN/TX	28480	07570-40045
31	1400-1384	6	4	CLAMP-CABLE .375-DIA PLSTC	02768	220-24200-04
32	1400-1403	0	2	CLAMP, CABLE	28480	1400-1403
33	3050-0225	1	4	WASHER, FLAT	28480	3050-0225
34	5001-6905	5	1	LABEL, CAUTION	28480	5001-0225
35	07570-00017	8	1	SHIELD, LEFT	28480	07570-00017
36	07570-00018	9	1	SHIELD, RIGHT	28480	07570-00018
37	0515-1597	5	3	SCREW MAX.7 14MM-LG	28480	0515-1597

Table 9-4. Parts List, Right-Hand Chassis

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07570-40075	2	1	COVER, PORT	28480	07570-40075
2	0515-0397	1	2	SCREW-MACH M4 X 0.7 16MM-LG	00000	ORDER BY DESCRIPTION
3	07570-40111	7	1	PANEL, REAR	28480	07570-40111
4	0515-1743	3	1	SCREW, TAPTITE	28480	0515-1743
5	07570-00027	0	1	CLAMP, ROD	28480	07570-00027
6	07570-20040	9	1	BUSHING	28480	07570-20040
7	1410-1237	9	2	BEARING-RDL BA 6-MM-ID 19-MM-OD 2-SHLD	55130	6262ZQE6HT2
8	07570-20025	0	1	SHAFT	28480	07570-20025
9	1500-0683	8	2	BELT-GEAR .25-IN-WD .043-IN-THK 103-IN-T	28480	1500-0683
10	07570-40120	8	1	PULLEY	28480	07570-40120
11	07570-40080	9	1	FLANGE	28480	07570-40080
12	07570-40006	9	2	CLAMP, MOTOR	28480	07570-40006
13	07570-60085	2	2	MOTOR ENCODER ASSY-INCLUDES ITEMS 14-17	28480	07570-60085
14	0515-1723	9	8	SCREW-MACHINE ASSEMBLY M2.5 X 0.45	28480	0515-1723
15	07570-40250	5	2	COVER, ENCODER	28480	07570-40250
16	QEDS-9500	3	2	IC, ENCODER	28480	QEDS-9500
17	0515-1723	9	1	SCREW-MACHINE ASSEMBLY M2.5 X 0.45	28480	0515-1723
18	07570-60003	8	1	CABLE ASSY, X-ENCODER	28480	07570-60003
19	07570-60002	7	1	CABLE ASSY, Y-ENCODER	28480	07570-60002
20	07570-40065	0	1	CLAMP, BEARING	28480	07570-40065
21	07570-00013	4	1	BRACKET, GROUND	28480	07570-00013
22	07570-40100	4	2	BRACKET, TENSIONER	28480	07570-40100
23	1460-2081	4	2	SPRING-EXT .187-IN-OD MUW ZN	28480	1460-2081
24	07550-40104	4	2	CAM, TENSIONER	28480	07550-40104
25	07570-60112	0	2	IDLER, TENSIONER	28480	07570-60112
26	07570-40035	4	1	SHIELD, PRIMARY	28480	07570-40035
27	07570-60041	4	1	POWER MODULE	28480	07570-60041
28	2110-0687	6	1	FUSEHOLDER-SPR TYP 6A 250 V	28480	2110-0687
29	9135-0248	4	4	VOLTAGE SELECTOR DRUM VOLTAGE: 100,120	28480	9135-0248
30	1400-1384	6	1	CLAMP-CABLE .375-DIA PLSTC	02768	220-24200-04
31	1460-2141	1	3	SPRING-TRSN 10.26-MM-OD 54.4-MM-OR-LG	28480	1460-2141
32	0535-0095	8	1	NUT-SQUARE NO-CHAM M4 X 0.7 3.2MM-THK	28480	0535-0095
33	07570-40240	3	1	CHASSIS, RIGHT	28480	07570-40240
34	07570-00011	2	1	SHIELD, CABLE	28480	07570-00011
35	0515-1722	8	1	SCREW-MACHINE ASSEMBLY M4 X 0.7 14MM-LG	28480	0515-1722
36	07570-60220	1	1	FRONT PANEL ASSEMBLY	28480	07570-60220
37	07570-60025	4	1	CABLE ASSY, FRONT PANEL	28480	07570-60025
38	0515-1597	5	1	SCREW-MACHINE ASSEMBLY M4 X 0.7 14MM-LG	28480	0515-1597
39	07570-60110	8	1	PCA A1, MAIN	28480	07570-60110
40	07570-00023	6	1	BASE, RIGHT-HAND	28480	07570-00023
41	0624-0684	0	1	SCREW, PLASTITE	28480	0624-0684
42	07570-40039	8	1	GUIDE, CARTRIDGE	28480	07570-40039
43	07570-40081	0	1	BRACKET, SWITCH	28480	07570-40081
44	07570-40115	1	1	LEVER, SWITCH	28480	07570-40115
45	07570-60061	8	1	SWITCH ASSEMBLY	28480	07570-60061
46	1460-2138	6	1	SPRING-EXT 3.2-MM-OD 15-MM-OR-LG SST	28480	1460-2138
47	1460-2133	1	1	SPRING-EXT 4.8-MM-OD 51-MM-OR-LG SST	28480	1460-2133
48	07570-40205	0	1	ARM, PJ RIGHT	28480	07570-40205
49	07570-60099	2	1	PINCHWHEEL	28480	07570-60099
50	07570-20035	2	2	SHAFT, PINCHWHEEL	28480	07570-20035
51	0905-1092	2	1	O-RING .07-IN-ID .07-IN-XSECT-DIA NTRL	83259	2-004N103-70
52	07570-40090	1	1	CAM, PINCHWHEEL	28480	07570-40090
53	0510-0015	0	2	RETAINER-RING E-R EXT .125-IN-DIA STL	28480	0510-0015
54	07570-20035	2	1	SHAFT, PJ ARM	28480	07570-20035
55	07570-40170	8	1	YOKE, PINCHWHEEL	28480	07570-40170
56	1460-2135	3	1	SPRING-EXT 11.1-MM-OD 60-MM-OR-LG MUW ZN	28480	1460-2135
57	07570-20030	7	1	BAR, PINCHWHEEL	28480	07570-20030
58	0535-0662	5	1	NUT, HEX 5/16	28480	0535-0662
59	1400-1021	8	2	CLIP, CABLE	28480	1400-1021
60	07570-00018	8	1	SHIELD, RIGHT	28480	07570-00018

Table 9-5. Parts List, Pen Carousel

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07570-60055	0	1	CAROUSEL, DRAFTING PENS	28480	07570-60055
	07570-60050	5	1	CAROUSEL, FIBER TIP PENS	28480	07570-60050
	5081-5098	3	1	LABEL, DRAFTING PENS	28480	5081-5098
	5081-5099	4	1	LABEL, FIBER TIP PENS	28480	5081-5099
	0624-0679	3	1	SCREW-TPG 6-19 2.25-IN-LG PAN-HD-POZI	28480	0624-0679
	07570-40066	1	1	HAT, CAROUSEL	28480	07570-40066
	07570-40215	2	1	TOP, CAROUSEL	28480	07570-40215
	1460-2124	0	2	SPRING-GTR 1.6-MM-OD 40-MM-0A-LG SST	28480	1460-2124
	07570-40225	4	1	BASE, CAROUSEL	28480	07570-40225
	07570-40220	9	8	PAWL	28480	07570-40220
	07570-40210	7	8	CAPPER	28480	07570-40210
	07475-40002	9	8	BOOT, FIBER PEN	28480	07475-40002
	07870-40235	9	8	BOOT, DRAFTING PEN	28480	07870-40235

Table 9-6. Parts List, Optional I/O Module (HP-IB)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	17570A	2	1	HP-IB INTERFACE MODULE	28480	17570A
	17571A	3	1	HP-IB + KANJI INTERFACE MODULE	28480	17571A
	07570-20097	6	1	DOOR, CARTRIDGE	28480	07570-20097
	1460-2132	0	1	SPRING-TRSN 4.16-MM-OD 67-MM-0A-LG SST	28480	1460-2132
	0515-1877	4	2	SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
	07570-00096	3	1	PANEL, REAR	28480	07570-00096
	1531-0319	2	1	PIN, DOOR	28480	1531-0319
	07570-20050	1	1	HOUSING	28480	07570-20050
	07570-60120	0	1	PCA, HP-IB	28480	07570-60120
	07570-60140	4	1	PCA, HP-IB + KANJI	28480	07570-60140
	07570-60010	7	1	PANEL, FRONT	28480	07570-60010
	1390-0551	4	2	SCREW, FLATHEAD	28480	1390-0551
11	0380-0644	4	2	STANDOFF-HEX .327-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
	1251-7999	4	1	DUST COVER-MICRO RBN 24 CONT CONN	71785	474-11-91-707

Table 9-7. Parts List, Main PCA

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
				DATE CODE 2647-11		
A1	07570-60110	8	1	PCA-MAIN	28480	07570-60110
A1	07570-66101	9	1	PCA-MAIN REBUILT	28480	07570-66101
C1	0160-3335	0	7	CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C2	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C3	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C4	0160-4835	7	11	CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C5	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C6	0180-3811	9	1	CAPACITOR-FXD 6800UF+-20% 50VDC AL	28480	0180-3811
C7				NOT USED		
C8				NOT USED		
C9	0160-4832	4	10	CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C10	0160-6597	2	1	CAPACITOR-FXD 1UF +-20% 250VDC MET-POLYE	D5243	MKT 1855-510/250
C11	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C12	0180-3810	8	1	CAPACITOR-FXD 68UF+-20% 50VDC AL	28480	0180-3810
C13	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C14	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C15	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C16	0180-3809	5	1	CAPACITOR-FXD 470UF+-20% 16VDC AL	28480	0180-3809
C17	0180-3705	0	2	CAPACITOR-FXD 47UF+-20% 50VDC AL	28480	0180-3705
C18	0180-3705	0		CAPACITOR-FXD 47UF+-20% 50VDC AL	28480	0180-3705
C19	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C20	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C21	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C22	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C23	0160-3335	0		CAPACITOR-FXD 470PF +-10% 100VDC CER	28480	0160-3335
C24	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C25	0160-4818	6	1	CAPACITOR-FXD 47PF +-10% 100VDC CER	28480	0160-4818
C26	0160-4803	9	1	CAPACITOR-FXD 68PF +-5% 100VDC CER 0+-30	28480	0160-4803
C27	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C28	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C29	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C30	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C31	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C32	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C33	0160-0207	9	1	CAPACITOR-FXD .01UF +-5% 200VDC POLYE	28480	0160-0207
C34	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C35	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C36	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C37	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C38	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C39	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
CR1	1901-1065	2	5	DIODE-PWR RECT 1N4936 400V 1A 200NS	14936	1N4936
CR2	1901-1229	0	4	DIODE-3A RECT 100PIV	28480	1901-1229
CR3	1901-1229	0		DIODE-3A RECT 100PIV	28480	1901-1229
CR4	1901-1229	0		DIODE-3A RECT 100PIV	28480	1901-1229
CR5	1901-1229	0		DIODE-3A RECT 100PIV	28480	1901-1229
CR7	1901-0965	9	1	DIODE-PWR RECT 100V 3A 200NS	28480	1901-0965
CR8	1901-1085	2		DIODE-PWR RECT 1N4936 400V 1A 200NS	14936	1N4936
CR9	1901-1085	2		DIODE-PWR RECT 1N4936 400V 1A 200NS	14936	1N4936
CR10	1901-1085	2		DIODE-PWR RECT 1N4936 400V 1A 200NS	14936	1N4936
CR11	1901-1065	2		DIODE-PWR RECT 1N4936 400V 1A 200NS	14936	1N4936
CR12	1901-1202	9	2	DIODE-HV RECT 175V 200MA 50NS D0-35	07263	FDH400
CR13	1901-1202	9		DIODE-HV RECT 175V 200MA 50NS D0-35	07263	FDH400
CR14	1901-0050	3	9	DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR15	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR16	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR17	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR18	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR19	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR20	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR21	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050
CR22	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS D0-35	28480	1901-0050

Table 9-7. Parts List, Main PCA (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E1	07570-00030	5	1	HEAT SINK-XSTR	28480	07570-00030
H1	0361-0482	8	2	RIVET-BLIND PL-STEM DOME-HD .125 DIA	28480	0361-0482
H2	0361-0482	8		RIVET-BLIND PL-STEM DOME-HD .125 DIA	28480	0361-0482
H3	0515-1877	4	6	SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H4	0515-1877	4		SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H5	0515-1877	4		SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H6	0515-1877	4		SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H7	0515-1877	4		SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H8	0515-1877	4		SCREW-THD-RLG M3 X 0.5 8MM-LG PAN-HD	93907	264-07200-382
H9	0340-1005	9	1	INSULATOR-XSTR POLYI	28480	0340-1005
H10	3050-1249	1	1	WASHER-SHLD NO. 4 .121-IN-ID 25-I-OD	86928	A364-156
J1	1252-1564	9	1	CONN-RS232	28480	1252-1564
J2	1252-1464	8	1	CONN-POST TYPE .100-PIN-SPCG 5-CONT	28480	1252-1464
J3	1252-0761	6	4	CONN-POST TYPE .156-PIN-SPCG 2-CONT	28480	1252-0761
J4	1252-1463	7	1	CONN-POST TYPE .100-PIN-SPCG 30-CONT	28480	1252-1463
J5	1252-0761	6	1	CONN-POST TYPE .156-PIN-SPCG 2-CONT	28480	1252-0761
J6	1252-0761	6		CONN-POST TYPE .156-PIN-SPCG 2-CONT	28480	1252-0761
J7	1252-1465	9	2	CONN-POST TYPE .100-PIN-SPCG 5-CONT	28480	1252-1465
J8	1252-1465	9		CONN-POST TYPE .100-PIN-SPCG 5-CONT	28480	1252-1465
J9	1252-1462	6	1	CONN-POST TYPE .100-PIN-SPCG 15-CONT	28480	1252-1462
J10	1252-0761	6		CONN-POST TYPE .156-PIN-SPCG 2-CONT	28480	1252-0761
Q1	1884-0326	8	1	THYRISTOR-TRIAC TO-220AB	04713	MAC320-4
Q2	1854-0973	8	5	TRANSISTOR NPN SI TO-92 PD=350MW	04713	MPS8098
Q3	1854-0973	8		TRANSISTOR NPN SI TO-92 PD=350MW	04713	MPS8098
Q4	1854-0973	8		TRANSISTOR NPN SI TO-92 PD=350MW	04713	MPS8098
Q5	1854-0973	8		TRANSISTOR NPN SI TO-92 PD=350MW	04713	MPS8098
Q6	1853-0626	6	4	TRANSISTOR PNP SI TO-92 PD=625MW	04713	MPS2907A
Q7	1853-0626	6		TRANSISTOR PNP SI TO-92 PD=625MW	04713	MPS2907A
Q8	1853-0626	6		TRANSISTOR PNP SI TO-92 PD=625MW	04713	MPS2907A
Q9	1853-0626	6		TRANSISTOR PNP SI TO-92 PD=625MW	04713	MPS2907A
Q10	1854-0456	2	5	TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
Q12	1855-0678	2	1	TRANSISTOR MOSFET N-CHAN E-MODE TO-220	3L585	RFP2N08L
Q13	1854-0456	2		TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
Q14	1854-0456	2		TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
Q15	1854-0456	2		TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
Q16	1854-0456	2		TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
Q17	1855-0677	1	4	TRANSISTOR MOSFET N-CHAN E-MODE TO-220	3L585	RFP12N08
Q18	1855-0677	1		TRANSISTOR MOSFET N-CHAN E-MODE TO-220	3L585	RFP12N08
Q19	1855-0677	1		TRANSISTOR MOSFET N-CHAN E-MODE TO-220	3L585	RFP12N08
Q20	1855-0677	1		TRANSISTOR MOSFET N-CHAN E-MODE TO-220	3L585	RFP12N08
Q21	1854-0973	8		TRANSISTOR NPN SI TO-92 PD=350MW	04713	MPS8098
R1	0683-4725	2	8	RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R2	0683-4725	2		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R3	0683-4725	2		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R4	0683-4725	2		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R5	0683-1025	9	9	RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R6	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R7	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R8	0683-1825	7	5	RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
R9	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R10	0683-6815	5	2	RESISTOR 680 5% .25W FC TC=-400/+600	01121	CB6815
R11	0683-2215	1	5	RESISTOR 220 5% .25W FC TC=-400/+600	01121	CB2215
R12	0683-2205	1		RESISTOR 22 5% .25W FC TC=-400/+500	01121	CB2205
R13	0683-2215	1		RESISTOR 220 5% .25W FC TC=-400/+600	01121	CB2215
R14	0683-2205	9		RESISTOR 22 5% .25W FC TC=-400/+500	01121	CB2205
R15	0683-2215	1		RESISTOR 220 5% .25W FC TC=-400/+600	01121	CB2215
R16	0683-2205	9		RESISTOR 22 5% .25W FC TC=-400/+500	01121	CB2205
R17	0683-2215	9		RESISTOR 220 5% .25W FC TC=-400/+600	01121	CB2215
R18	0683-2205	9		RESISTOR 22 5% .25W FC TC=-400/+500	01121	CB2205
R19	0683-4725	9		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R20	0683-2205	9		RESISTOR 22 5% .25W FC TC=-400/+500	01121	CB2205
R21	0683-1025	9	5	RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R22	0757-0411	2		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
R23	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R24	0757-0411	2		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
R25	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025

Table 9-7. Parts List, Main PCA (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R26	0757-0411	2	6	RESISTOR 332 1% .125W F TC=0+/-100	24546	C4-1/8-T0-332R-F
R27	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R28	0757-0411	2		RESISTOR 332 1% .125W F TC=0+/-100	24546	C4-1/8-T0-332R-F
R29	0683-3345	0		RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R30	0683-1825	7		RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
R31	0683-2735	0	4	RESISTOR 27K 5% .25W FC TC=-400/+800	01121	CB2735
R32	0683-4725	2		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R33	0683-2215	1	3	RESISTOR 220 5% .25W FC TC=-400/+600	01121	CB2215
R34	0683-4735	4		RESISTOR 47K 5% .25W FC TC=-400/+800	01121	CB4735
R35	0683-4725	2		RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R36	0683-3345	0	1	RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R37	0683-4735	4		RESISTOR 47K 5% .25W FC TC=-400/+800	01121	CB4735
R38	0683-2735	0		RESISTOR 27K 5% .25W FC TC=-400/+800	01121	CB2735
R39	0683-6815	5		RESISTOR 680 5% .25W FC TC=-400/+800	01121	CB6815
R40	0683-1015	7		RESISTOR 100 5% .25W FC TC=-400/+500	01121	CB1015
R41	0683-4725	2	2	RESISTOR 4.7K 5% .25W FC TC=-400/+700	01121	CB4725
R42	0683-1825	7		RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
R43	0757-0411	2		RESISTOR 332 1% .125W F TC=0+/-100	24546	C4-1/8-T0-332R-F
R44	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4-1/8-T0-3161-F
R45	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0+/-100	24546	C4-1/8-T0-6811-F
R46	0683-1825	7	1	RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
R47	0683-2735	0		RESISTOR 27K 5% .25W FC TC=-400/+800	01121	CB2735
R48	0683-4735	4		RESISTOR 47K 5% .25W FC TC=-400/+800	01121	CB4735
R49	0683-2735	0		RESISTOR 27K 5% .25W FC TC=-400/+800	01121	CB2735
R50	0683-0084	9		RESISTOR 2.15K 1% .125W F TC=0+/-100	24546	C4-1/8-T0-2151-F
R51	0757-0439	4	1	RESISTOR 6.81K 1% .125W F TC=0+/-100	24546	C4-1/8-T0-6811-F
R52	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4-1/8-T0-3161-F
R53	0683-3345	0		RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R54	0683-3345	0		RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R55	0683-3345	0		RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R56	0683-3345	0	1	RESISTOR 330K 5% .25W FC TC=-800/+900	01121	CB3345
R57	0683-1825	7		RESISTOR 1.8K 5% .25W FC TC=-400/+700	01121	CB1825
R58	0683-1025	9		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
RN1	1810-0950	9	1	NETWORK-RES 14-DIP 1.3K OHM X 13	01121	314A132
RN2	1810-0126	1	1	NETWORK-RES 14-DIP10.0K OHM X 13	11236	760-1-R10K
RN3	1810-0167	0	2	NETWORK-RES 8-SIP330.0 OHM X 4	01121	2088331
RN4	1810-0167	0	0	NETWORK-RES 8-SIP330.0 OHM X 4	01121	2088331
S1	3101-2879	4	1	SWITCH-SL 12-1A DIP-SLIDE-ASSY .1A 50VDC	11237	11P2489A
T1	9100-4555	1	1	TRANSFORMER, SWITCHING	28480	9100-4555
U1	1820-3322	6	1	IC DRVR DTL COMM EIA RS-232C QUAD	04713	MC1488P
U2	1820-4196	4	1	IC MUXR/DATA-SEL CMOS/74HC 2-T0-1-LINE	27014	MM74MCT157N
U3	1820-3321	5	1	IC RCVR DTL COMM EIA RS-232C QUAD	04713	MC1488AP
U4	1820-1050	3	2	IC DRVR TTL NOR DUAL 2-INP	01295	SN75454BP
U5	1820-1050	3	3	IC DRVR TTL NOR DUAL 2-INP	01295	SN75454BP
U6	1820-4292	1	1	IC-CONTROL-ORIENTED CPU W/RAM AND I/O	34649	P8032AH
U7	1820-4441	2	1	IC LCH CMOS/74HC TRANSPARENT OCTL	31585	CD74MCT573E
U8	1826-0138	8	2	IC COMPARATOR GP QUAD 14-DIP-P PKG	01295	LM339N
U9	1820-4620	9	1	IC CMOS 65536(64K) STAT RAM 150-NS 3-S	28480	1820-4620
U10	1818-3198	9	1	IC CMOS 65536(64K) STAT RAM 150-NS 3-S	28480	1818-3198
U11	1826-0138	8	1	IC COMPARATOR GP QUAD 14-DIP-P PKG	01295	LM339N
U12	1826-1117	5	1	IC V RGLTR-SWG 16-DIP-P PKG	28480	1826-1117
U13	1TM6-0001	2	1	IC-SERVO	28480	1TM6-0001
U14	07570-18004	0	1	IC-ROM	28480	07570-18004
VR1	1902-1508	0	2	DIODE 44.3V 5%	28480	1902-1508
VR2	1902-1508	0	1	DIODE 44.3V 5%	28480	1902-1508
VR3	1902-0551	1	1	DIODE-ZNR 6.2V 5% PD=1W IR=10UA	28480	1902-0551
VR4	1902-3306	0	1	DIODE-ZNR 36.5V 5% DO-35 PD=.4W	28480	1902-3306
XU9	1200-0654	7	1	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
XU14	1200-0567	1	1	SOCKET-IC 28-CONT DIP DIP-SLDR	28480	1200-0567
Y1	0410-1592	8	1	RESONATOR 12MHZ	28480	0410-1592

Table 9-8. Parts List, Optional Interface PCA (HP-IB)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	17570A	2		Date Code 2612-11 HPIB	28480	17570A
C1	0160-4835	7	5	CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C2	0160-4832	4	2	CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C3	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C4	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C5	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C6	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C7	0160-4574	1	1	CAPACITOR-FXD 1000PF +-10% 100VDC CER	28480	0160-4574
C8	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
P1	1251-8664	2	1	CONN-POST TYPE .100-PIN-SPCG 30-CONT	28480	1251-8664
J1	1252-1492	2	1	CONN-RECT MICROBEN 24-CKT 24-CONT	28480	1252-1492
R1	0683-2235	5	1	RESISTOR 2.2K 5% .25W FC TC=-400/+700	28480	0683-2235
RN1	1810-0206	8	2	NETWORK-RES 8-SIP10.0K OHM X 7	01121	208A103
RN2	1810-0206	8		NETWORK-RES 8-SIP10.0K OHM X 7	01121	208A103
S1	3101-2880	7	1	SWITCH-SL 6-1A DIP-SLIDE-ASSY .1A 50VDC	11237	11P2488A
U3+	1820-2549	7	1	IC-8291A P HPIB	28480	1820-2549
U4	1820-4602	7	1	IC DRV R CMOS/74HC LINE HEX	18324	74HCT365N
U5	1820-3629	6	1	IC INV CMOS/74HC HEX	27014	MM74HCT04N
U6	1820-4441	2	1	IC LCH CMOS/74HC TRANSPARENT OCTL	3L585	CD74HCT573E
U9	1820-3847	0	1	IC DCDR CMOS/74HC BIN 3-T0-8-LINE	27014	MM74HCT138N
U10	1LH4-0001	4	1	IC HPIB XCVR	28480	1LH4-0001

Table 9-9. Parts List, Optional Interface PCA (HP-IB + Kanji)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
				Date Code 2612-11		
	17571A	3		HPIB/KANJI	28480	17571A
C1	0160-4835	7	5	CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C2	0160-4832	4	2	CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C3	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C4	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C5	0160-4832	4		CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
C6	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
C7	0160-4574	1	1	CAPACITOR-FXD 1000PF +-10% 100VDC CER	28480	0160-4574
C8	0160-4835	7		CAPACITOR-FXD .1UF +-10% 50VDC CER	28480	0160-4835
J1	1252-1492	2	1	CONN-RECT MICRORBN 24-CKT 24-CONT	28480	1252-1492
P1	1251-8664	2	1	CONN-POST TYPE .100-PIN-SPCG 30-CONT	28480	1251-8664
R1	0683-2235	5	1	RESISTOR 22K 5% .25W FC TC=-400/+800	01121	CB2235
RN1	1810-0206	8	1	NETWORK-RES 8-SIP10.0K OHM X 7	01121	208A103
RN2	1810-0206	8	1	NETWORK-RES 8-SIP10.0K OHM X 7	01121	208A103
S1	3101-2880	7	1	SWITCH-SL 6-1A DIP-SLIDE-ASSY .1A 50VDC	11237	11P2488A
U1	07570-18005	1	1	IC-EPROM A	28480	07570-18005
U2	07570-18010	8	1	IC-EPROM B	28480	07570-18010
U3	1820-2549	7	1	IC-8291A P HPIB	28480	1820-2549
U4	1820-4602	7	1	IC DRVR CMOS/74HC LINE HEX	18324	74HCT365N
U5	1820-3629	6	1	IC 74HCT04	18324	74HC04
U6	1820-4441	2	1	IC LCH CMOS/74HC TRANSPARENT OCTL	31585	CD74HCT573E
U7	07570-18015	3	1	IC-EPROM C	28480	07570-18015
U8	1820-4630	1	1	IC-74HCT163	28480	1820-4630
U9	1820-3847	0	1	IC DCOR CMOS/74HC BIN 3-TO-8-LINE	27014	MM74HCT138N
U10	1LH4-0001	4	1	IC HPIB XCVR	28480	1LH4-0001

Table 9-10. Reference Designations and Abbreviations

REFERENCE DESIGNATIONS

A assembly	E miscellaneous electrical part	MP . . . miscellaneous mechanical part	U integrated circuit; microcircuit
AT . . . attenuator; isolator; termination	F fuse	P electrical connector (movable portion); plug	VR voltage regulator; breakdown diode
B fan; motor	FL filter	Q transistor; SCR; thyristor	W cable; transmission path; wire
BT battery	H hardware	R resistor	X socket
C capacitor	J electrical connector (stationary portion) jack	RT thermistor	Y crystal unit (piezo-electric or quartz)
CR diode; diode thyristor; varacter	K relay	S switch	
DS . . . annunciator; signaling device (audible or visual); lamp; LED	L coil; inductor	T transformer	
	M meter	TP test point	

ABBREVIATIONS

A ampere	deg . . . degree (temperature interval or difference)	EEPROM . . . electrically erasable programmable read only memory	HR hour
ac alternating current	° degree (plane angle)	EXT external	HV high voltage
ADJ . . . adjustment	°C . . . degree Celsius	F farad	Hz Hertz
A/D . . . analog-to-digital	°F degree Fahrenheit	FET field-effect transistor	IC integrated circuit
AMPL . . . amplifier	°K . . . degree Kelvin	F/F flip flop	ID . . . inside diameter
ASSY . . . assembly	diam diameter	FH flat head	in inch
AWG . . . American wire gauge	DIA diameter	FM frequency modulation	INCD . . . incandescent
BCD . . . binary coded decimal	DIFF AMPL . differential amplifier	FP front panel	INCL include(s)
BKDN . . breakdown	DPDT . . double-pole, double-throw	FP flame proof	INP input
CAL calibrate	DTL diode transistor logic	FREQ . . . frequency	INS insulation
ccw counter-clockwise	DVM digital voltmeter	FXD fixed	INT internal
CER ceramic	ECL . . . emitter coupled logic	g gram	kg kilogram
CHAN . . . channel	EMF . . . electromotive force	GE germanium	kHz kilohertz
cm centimetre	EDP . . . electronic data processing	GHz gigahertz	kΩ kilohm
COAX coaxial	ELECT . . electrolytic	GL glass	kV kilovolt
COEF . . . coefficient	EAROM . electrically alterable read only memory	GND ground(ed)	lb pound
COM common	EPROM . electrically programmable read only memory	H henry	LC inductance-capacitance
COMP . . . composition		h hour	LED . . . light-emitting diode
CONN . . . connector		HEX hexagonal	LF low frequency
CTL . . . complementary transistor logic		HD head	LG long
cw clockwise		HDW hardware	LH left hand
D/A . . . digital-to-analog		HG mercury	Lim limit
dB decibel		HI high	LIN linear taper (used in parts list)
dBm decibel referred to 1 mW		HP Hewlett-Packard	lin linear
dc direct current		HPF high pass filter	LKWASH lock washer
			LO low; local oscillator

NOTE

All abbreviations in the parts list will be in upper case.

Table 9-10. Reference Designations and Abbreviations (continued)

ABBREVIATIONS (cont.)

LOG . . . logarithmic taper	μ H microhenry	p-p . . . peak-to-peak (used in parts list)	SNR . . . signal-to-noise ratio
log . . . logarithm(ic)	μ s microsecond	PPM parts per million	SPDT . . . single-pole, double-throw
LPF . . . low pass filter	μ V microvolt	PREAMPL pre-amplifier	SPG spring
LV low voltage	μ Vac . . . microvolt, ac	PRF pulse-repetition frequency	SR split ring
m metre (distance)	μ Vdc . . . microvolt, dc	PRR pulse repetition rate	SPST . . . single-pole, single-throw
mA milliampere	μ Vpk . . . microvolt, peak	ps picosecond	SST stainless steel
MAX maximum	μ Vp-p . . . microvolt, peak-to-peak	PT point	STL steel
M Ω megohm	μ Vrms . . . microvolt, rms	PWV . . . peak working voltage	SQ square
MEG meg (10^6) (used in parts list)	μ W microwatt	RAM . . . random access memory	SYNC . . . synchronize
MET FLM . . . metal film	nA nanoampere	RC resistance-capacitance	T timed (slow-blow fuse)
MET OX . . . metallic oxide	N/C normally closed	RECT rectifier	TA tantalum
MF medium frequency; microfarad	NEG negative	REF reference	TC temperature coefficient
MFR . . . manufacturer	NI PL . . . nickel plate	REG regulated	TD time delay
mg milligram	N/O . . . normally open	REPL . . . replaceable	TERM terminal
MHz megahertz	NOM nominal	RF radio frequency	TGL toggle
mH millihenry	NORM normal	RFI . . . radio frequency interference	THD thread
mho mho	NPN . . . negative-positive-negative	RH round head; right hand	THRU through
MIN minimum	ns nanosecond	RLC resistance-inductance-capacitance	TI titanium
min minute (time)	nW nanowatt	rms root-mean-square	TOL tolerance
min minute (plane angle)	OBD order by description	RND round	TRIM trimmer
mm millimetre	OD . . . outside diameter	ROM read only memory	TSTR transistor
MOD modulator	OPAMPL operational amplifier	s second (time)	TTL transistor-transistor logic
MON momentary	OPT option	" second (plane angle)	U micro (10^{-6}) (used in parts list)
MOS metal-oxide semiconductor	OSC oscillator	S-B . . . slow-blow fuse	UNREG . . . unregulated
ms millisecond	OX oxide	SCR silicon controlled rectifier; screw	V volt
MTG mounting	oz ounce	SE selenium	VA voltampere
MTR meter (indicating device)	Ω ohm	SECT sections	Vac volts, ac
mV millivolt	P peak	SEMICON semiconductor	VAR variable
mVac . . . millivolt, ac	PC printed circuit	SI silicon	Vdc volts, dc
mVdc . . . millivolt, dc	pF picofarad	SIL silver	VDCW volts, dc, working
mVpk . . . millivolt, peak	PIV peak inverse voltage	SL slide	Vpk volts, peak
mVp-p . . millivolt, peak-to-peak	pk peak		Vp-p volts, peak-to-peak
mVrms . . . millivolt, rms	PNP . . . positive-negative-positive		Vrms volts, rms
mW milliwatt	P/O part of		VTVM vacuum-tube voltmeter
MUX multiplex	POLY . . . polystyrene		W watt
MY mylar	PORC porcelain		WIV working inverse voltage
μ A microampere	POS positive; position(s)		WW wirewound
μ F microfarad	POSN position		W/O without
	POT potentiometer		

NOTE

All abbreviations in the parts list will be in upper case.

Table 9-10. Reference Designations and Abbreviations (continued)

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^9
M	mega	10^6
k	kilo	10^3
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
u	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 9-11. Code List of Manufacturers

Mfr Code	Manufacturer Name	Address	Zip Code
05243	ROEDERSTEIN GMBH	LANDSHUT GM	8300
00000	ANY SATISFACTORY SUPPLIER		
01121	ALLEN-BRADLEY CO INC	EL PASO TX US	79935
01295	TEXAS INSTRUMENTS INC	DALLAS TX US	75265
02768	ITW FASTEX	DES PLAINES IL US	60018
04713	MOTOROLA INC SEMI-COND PROD	PHOENIX AZ US	85008
07263	FAIRCHILD CORP	MOUNTAIN VIEW CA US	94042
11236	CTS CORP BERNE DIV	BERNE IN US	46711
11237	CTS CORP PASO ROBLES	PASO ROBLES CA US	93446
14936	GENERAL INSTRUMENT CORP (DIODE)	HICKSVILLE NY US	11802
18324	SIGNETICS CORP	SUNNYVALE CA US	94086
24546	CORNING ELECTRONICS	SANTA CLARA CA US	95050
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA US	95052
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
31585	RCA CORP SOLID STATE DIV	SOMERVILLE NJ	
34649	INTEL CORP	SANTA CLARA CA US	95054
55130	SKINNER PRECISION INDUSTRIES INC	NEW BRITAIN CT	06050
71785	TRW CONNECTORS	ELK GROVE VILLA IL US	60007
83259	PARKER SEAL CO DIV PARKER-HANNIFIN	LEXINGTON KY	90231
86928	SEASTROM MFG CO	GLENDALE CA	91201
93907	CAMCAR SCREW & MFG CO	ROCKFORD IL	61101

10-1. INTRODUCTION

10-2. This chapter contains miscellaneous reference material including system error codes and mnemonics.

10-3. OTHER MANUALS

10-4. In addition to this manual, other manuals which apply to the HP 7570 are:

Manual	HP Part Number
Programmers Reference	07570-90001
Users Guide	07570-90002

10-5. SYSTEM ERROR CODES

10-6. System I/O error codes are listed in Table 10-1. Error codes for HP-GL are listed in Table 10-2.

10-7. MNEMONICS

10-8. Mnemonics used through out this manual are listed alphabetically in Table 10-3.

10-9. OTHER TECHNICAL DATA

10-10. Organizational abbreviations are listed in Table 10-5.

Table 10-1. I/O Error Codes

Error Code	Meaning
0	A zero indicates there was no I/O error.
*10	Output instruction received while another output instruction is executing. The original output instruction will continue normally while the one in error will be ignored.
11	Invalid byte received following the first two characters (ESC.) in a device control instruction.
12	Invalid byte received while parsing a device control instruction. Parameters are defaulted from the parameter where the invalid byte was received to the end of the instruction.
13	Parameter out of range.
14	Too many parameters received. Additional parameters beyond the proper number are ignored, and the parsing of the instruction ends when a colon (normal exit) or the first byte of another instruction is received (abnormal exit).
<p style="text-align: center;">NOTE:</p> <p>The receipt of something other than another parameter, a semicolon, or a colon will result in an error type 12 overwriting error type 14.</p>	
*15	A framing error, parity error, or overrun error has been detected.
*16	The input buffer memory has overflowed. As a result of the overflow, one or more bytes of data have been lost, and therefore, an HP-GL error will probably also occur.
*17	Baud rate mismatch, or full duplex data communication is selected and conditions for data transmission are not met. e.g., Cabling is configured for three-wire data communications.
*18	I/O error of indeterminate cause.

* RS-232-C Interface Only

Table 10-2. HP-GL Error Codes

Error Code	Meaning
0	No HP-GL error for which the mask is set has occurred.
1	Instruction not recognized. The plotter has received an illegal character sequence.
2	Wrong number of parameters. Too many or too few parameters have been sent with the instruction.
3	Bad parameter. The parameters sent to the plotter with an instruction are out-of-range for that instruction or include an illegal character.
4	Not used
5	Unknown character set. A character set out of the range -1 through 59 or 99 has been designated. (CS, CA, or DS instruction).
6	Position overflow. Numeric overflow in plotter's character generator.
7	Buffer overflow for polygons.

Table 10-3. Mnemonics

Mnemonic	Definition
ALE	ADDRESS LATCH ENABLE
APE	AUTOMATIC POLL ENABLE
ATN	ATTENTION
BP0-BP7	BACK PANEL SWITCH BUS
CLK	CLOCK
COMPEN	COMPARATOR ENABLE
COMPX	COMPARATOR X FEEDBACK SIGNAL
COMPY	COMPARATOR Y FEEDBACK SIGNAL
CS	CHIP SELECT
CTS	CLEAR TO SEND
DAC	DATA ACCEPTED
DAV	DATA AVAILABLE
DIO	DATA INPUT/OUTPUT
DISAB	DISABLE
DMAACK	DIRECT MEMORY ACCESS ACKNOWLEDGE
DMAREQ	DIRECT MEMORY ACCESS REQUEST
DSR	DATA SET READY
DTR	DATA TERMINAL READY
EOI	END OR IDENTIFY
EXT	EXTERNAL
FP0-FP7	FRONT PANEL SWITCH BUS
HP-GL	HEWLETT-PACKARD GRAPHICS LANGUAGE
HP-IB	HEWLETT-PACKARD INTERFACE BUS
IFC	INTERFACE CLEAR
INT	INTERRUPT
LED0-LED3	FRONT PANEL LED LINES
NB0-NB5	NIBBLE BUS -- COMMUNICATION LINES BETWEEN THE TWO MICROPROCESSORS.
NDAC	NOT DATA ACCEPTED
NRFD	NOT READY FOR DATA
NRXD2	NOT RECEIVED SECONDARY DATA
NSAFE	NOT SAFE
PPL	PARALLEL POLL LATCH
PSEN	PROGRAM STORE ENABLE
PWM	PULSE WIDTH MODULATOR

Table 10-3. Mnemonics (continued)

Mnemonic	Definition
RD	READ
RFD	READY FOR DATA
RLS	RECEIVED LINE SIGNAL
RST	RESET
RXD	RECEIVED DATA
SALE	SERVO ADDRESS LATCH ENABLE
SAD0-SAD7	SERVO ADDRESS/DATA LINES
SOLDR	SOLENOID DRIVE
SRD	SERVO READ
SRQ	SERVICE REQUEST
SWR	SERVO WRITE
T/R	TRANSMIT/RECEIVE
TXD	TRANSMITTED DATA
VM	MOTOR VOLTAGE -- A NOMINAL +32V
VTH	THRESHOLD VOLTAGE -- A POWER SUPPLY REFERENCE
WR	WRITE
XDRVA	X-AXIS PHASE A DRIVE
XDRVB	X-AXIS PHASE B DRIVE
XENC	X-AXIS ENCODER
YDRVA	Y-AXIS PHASE A DRIVE
YDRVB	Y-AXIS PHASE B DRIVE
YENC	Y-AXIS ENCODER

Table 10-5. Organizational Abbreviations

Abbreviation	Full Name
ANSI	American National Standards Institute
CCITT	International Telegraph and Telephone Consultative Committee
EIA	Electronics Industries Association
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization

11-1. INTRODUCTION

11-2. This chapter describes the differences between earlier models of the HP 7570 and the latest version documented in this manual. These earlier models are identified by their serial number prefix and the date code on their printed-circuit assemblies (PCAs). For ease of reference this chapter is divided into these two major topics.

- History of Assemblies by Product Serial Number Prefix
- History of Printed Circuit Assemblies

11-3. HISTORY OF ASSEMBLIES BY PRODUCT SERIAL NUMBER PREFIX

11-4. Table 11-1 is a quick-reference table that lists by serial number prefix the assemblies that differ from those documented in this manual. Also referenced are item numbers under which these differences are described in this chapter.

Table 11-1. Assemblies by Product Serial Number Prefix

HP7570 S/N Prefix	Assemblies	Items
2618A	None changed	1,2
2631A	Covers and Chassis	2
	Center Chassis	
	Right-Hand Chassis	

11-5. Table 11-2 lists the assemblies, other than PCAs, that are described under the items in this chapter.

Table 11-2. Item Description

Items	Assemblies
1	None changed
2	Covers and Chassis
	Center Chassis
	Right-Hand Chassis

11-6. Knowing the serial number prefix of a plotter you can readily find in Table 11-1 which assemblies are documented in this chapter. Using Table 11-2 you can readily see if more than one change has been made to the assembly in question, and which items in this chapter to reference.

11-7. HISTORY OF PRINTED CIRCUIT ASSEMBLIES

11-8. Hewlett-Packard's printed-circuit assemblies have three major identification features.

- a. **Part Number.** All PCAs having the same part number are directly interchangeable. If a PCA is revised in any way that makes it non-interchangeable with previously issued PCAs of the same part number, a new part number is assigned to the revised PCA.
- b. **Revision Letter.** This letter identifies the most recent revision to the etched circuit pattern. The original issue is identified with the letter 'A'. If the master artwork for a printed circuit board is revised in order to alter performance or manufacture, the revision letter is changed to the next letter in the alphabetical sequence.
- c. **Assembly Date Code.** The date code on the PCA is a four-digit number which identifies the assembly level by date code. The first two digits represent the last two digits of the current year and are derived by subtracting 60 from the current year; the last two digits are the number of the week in that year. Any digits following a hyphen in the date code represent the division that manufactured the PCA.

11-9. The PCA assembly date code is changed when a component part number is changed which alters the performance of the PCA.

11-10. Table 11-3 is a quick reference table that lists PCAs by part number and date code. Listed next to the part number and date code are the items following this table that describe the differences between the PCA in question and the level of that PCA described in the main body of this manual.

Table 11-3. PCA Date Code

PCA Part Number	PCA Date Code	PCA Rev. Letter	Item
A1 Main PCA 07570-60100	2612-11 2625-11	A A	3,4 4

ITEM 1

There were no physical changes to the HP 7570. The serial number prefix was changed when the FCC Certification was upgraded from A to B.

ITEM 2

Except for the following, and any applicable higher numbered items, the Covers and Chassis Assemblies were the same as documented in the main body of this manual.

REF DES	HP PART NUMBER	C D	QTY	DESCRIPTION	MFR CODE	MFR PART NUMBER
7	07570-00090	7	1	COVER, CENTER	28480	07570-00090
27				NOT USED		
28				NOT USED		
29				NOT USED		
30				NOT USED		
31				NOT USED		

Except for the following, and any applicable higher numbered items, the Center Chassis Assembly was the same as documented in the main body of this manual.

REF DES	HP PART NUMBER	C D	QTY	DESCRIPTION	MFR CODE	MFR PART NUMBER
18	07570-00026	9	1	CLAMP, ROD	28480	07570-00026
21	07570-00105	5	1	PAN	28480	07570-00105
26	9100-4556	2	1	TRANSFORMER ASSY	28480	9100-4556
35				NOT USED		
36				NOT USED		
37				NOT USED		

Except for the following, and any applicable higher numbered items, the Right-Hand Chassis Assembly was the same as documented in the main body of this manual.

REF DES	HP PART NUMBER	C D	QTY	DESCRIPTION	MFR CODE	MFR PART NUMBER
5	07570-00026	9	1	CLAMP, ROD	28480	07570-00026
27	07570-60040	3	1	POWER MODULE	28480	07570-60040
39	07570-60100	6	1	A1 PCA, MAIN	28480	07570-60100
40	07570-00020	3	1	BASE, RIGHT	28480	07570-00020
59				NOT USED		

ITEM 3

The Main PCA A1 had a Date Code of 2612-11 at introduction. Except for the following differences, plus any applicable higher numbered items, the PCA was the same as that documented in the main body of this manual.

REF DES	HP PART NUMBER	C QTY D	DESCRIPTION	MFR CODE	MFR PART NUMBER
U14	07570-18001	7 1	IC, ROM	28480	07570-18001

* For replacement of U14 use 07570-18002.

ITEM 4

Except for the following differences, plus any applicable higher numbered items, the PCA, Date Code 2625-11 was the same as that documented in the main body of this manual.

REF DES	HP PART NUMBER	C QTY D	DESCRIPTION	MFR CODE	MFR PART NUMBER
U14	07570-18002	8 1	IC, ROM	28480	07570-18002

* For replacement of U14 use 07570-18004.

12-1. INTRODUCTION

12-2. This chapter contains drawings which are larger than the standard manual page size. These "foldouts" include mechanical assembly drawings, component location diagrams, and schematic diagrams.

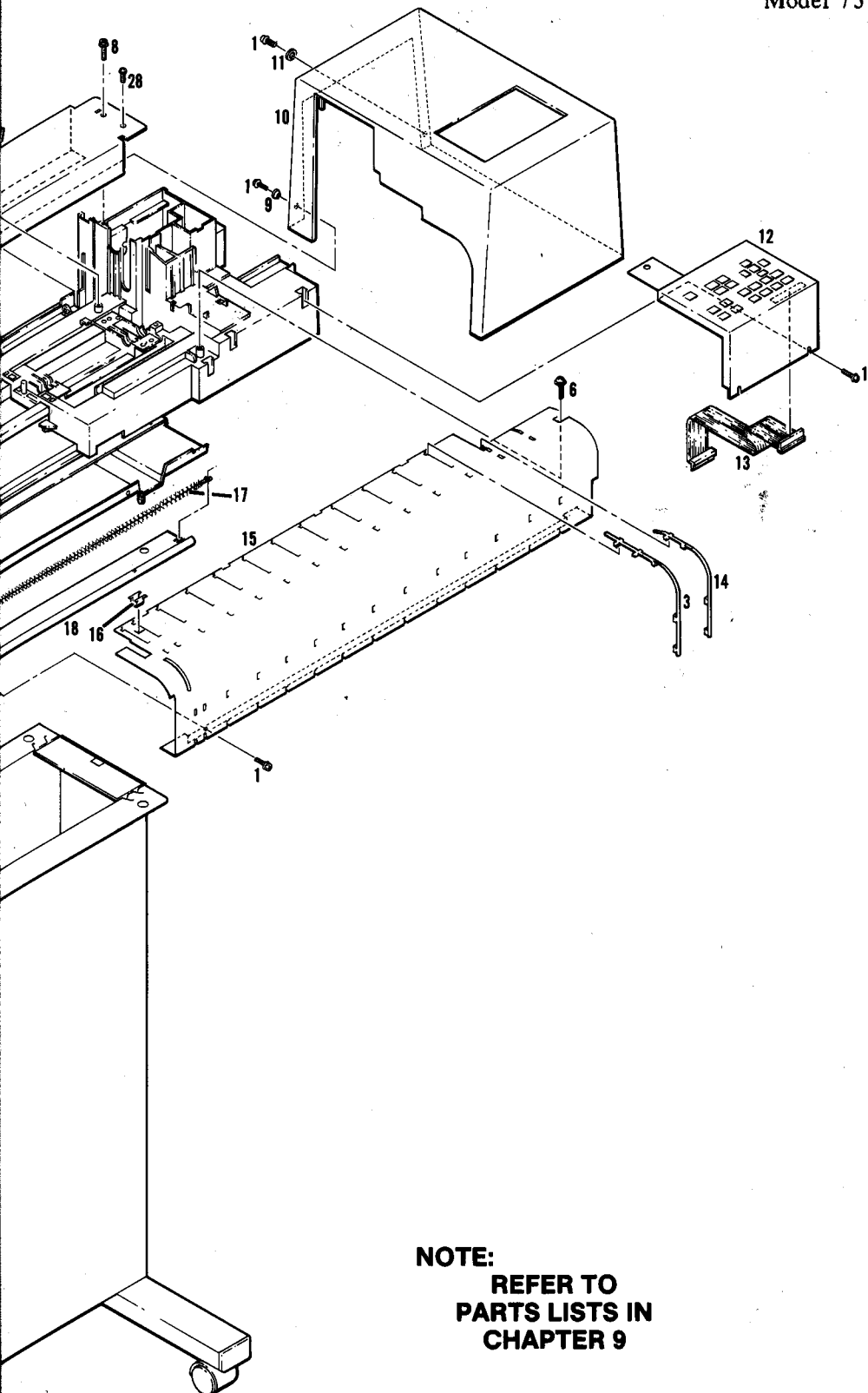
12-3. ENGINEERING DIAGRAMS

12-4. Mechanical Diagrams

12-5. The illustrated parts breakouts, Figures 12-1 through 12-6, may be used in conjunction with the lists of replaceable parts in Chapter 9 for ordering replacement parts and assemblies for the HP 7570.

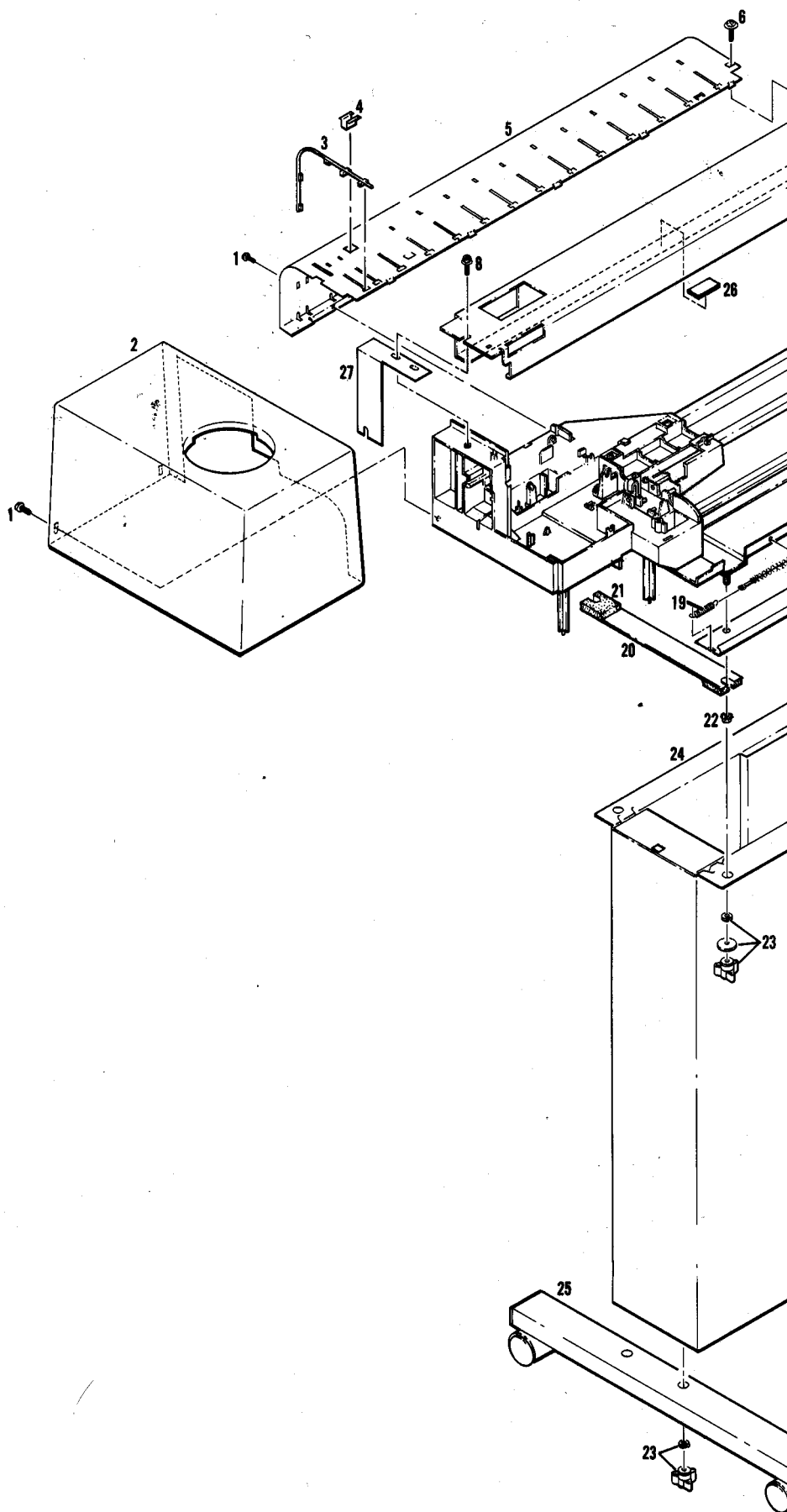
12-6. Electrical Diagrams

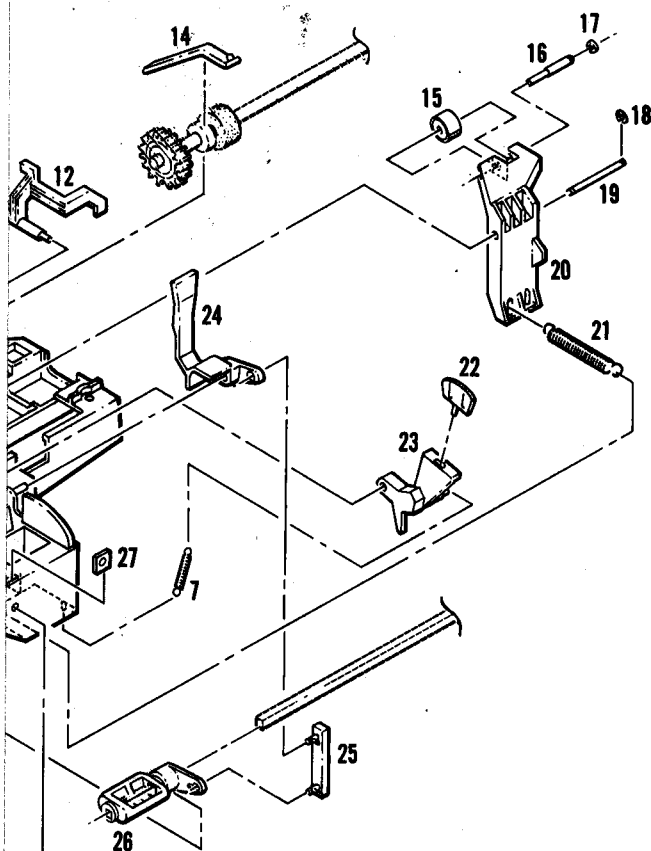
12-7. The schematic diagram notes, block diagrams, and the cable and connector diagram are found in figures 12-7 through 12-10. The component location diagrams and schematic diagrams for the HP 7570 are found in Figures 12-11 through 12-16. The schematic diagram and component location diagram for the optional HP-IB interface module are found in Figures 12-16 and 12-17.



NOTE:
REFER TO
PARTS LISTS IN
CHAPTER 9

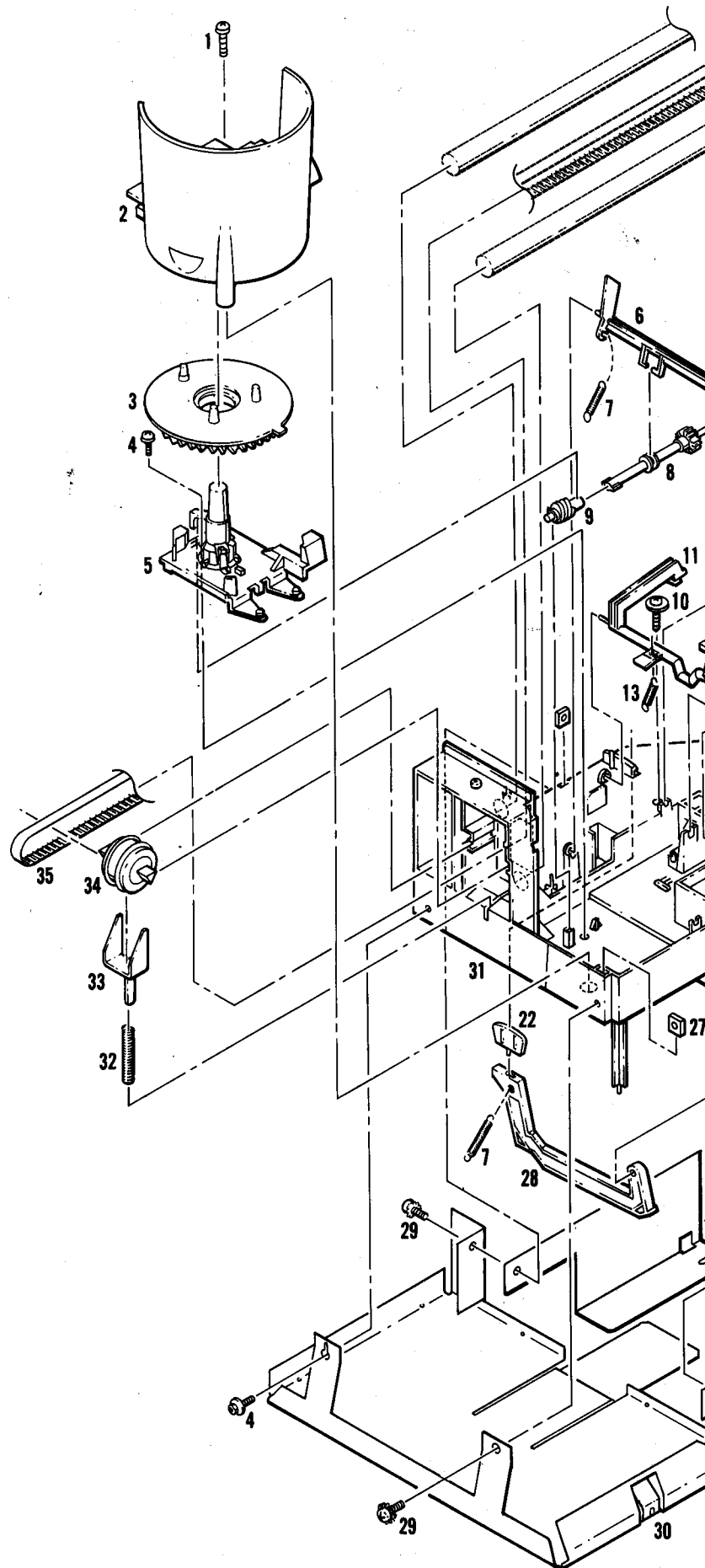
Figure 12-1. Covers and Chassis Assemblies,
 Illustrated Parts Breakout





NOTE:
REFER TO
PARTS LISTS IN
CHAPTER 9

Figure 12-2. Left-Hand Chassis Assembly,
Illustrated Parts Breakout



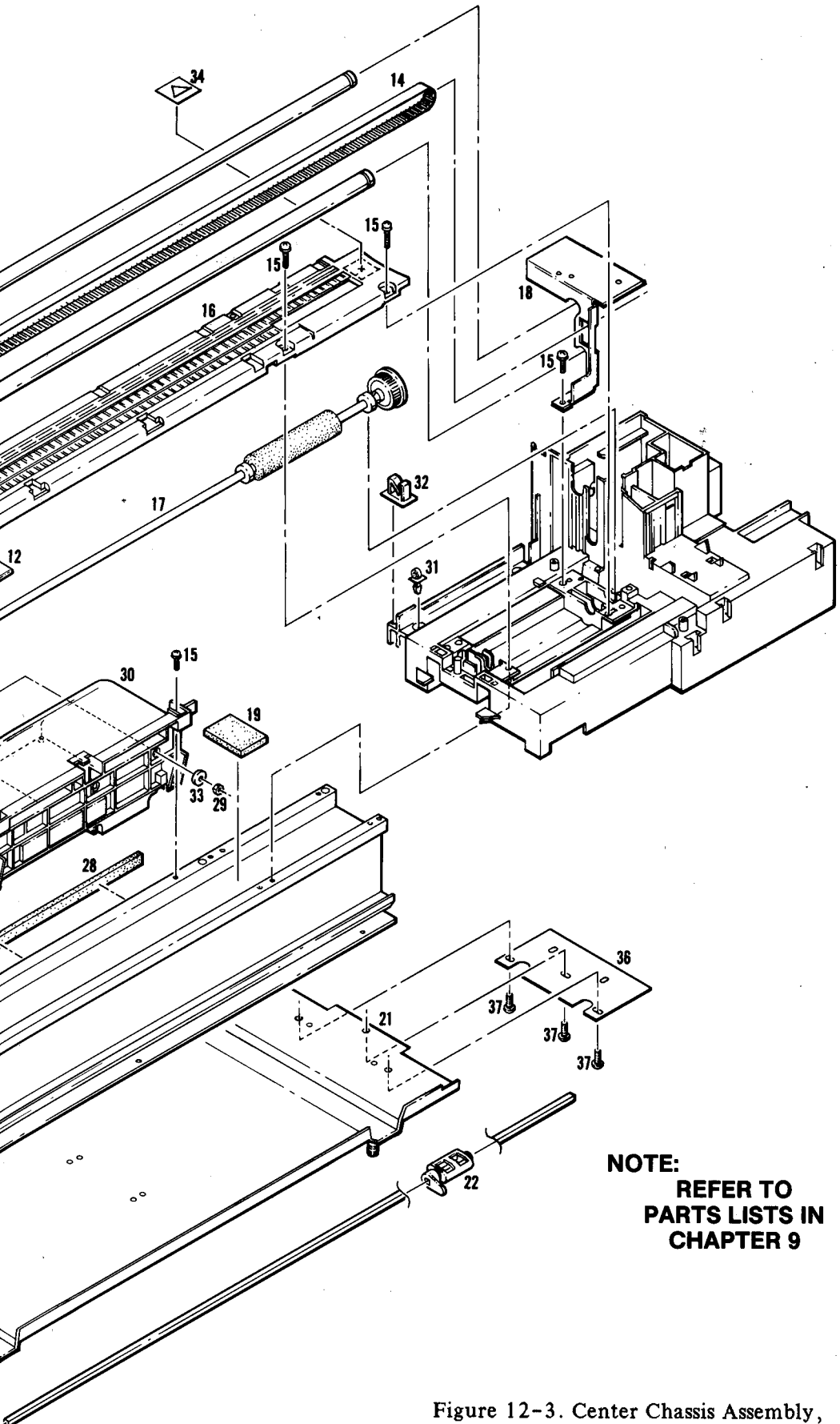
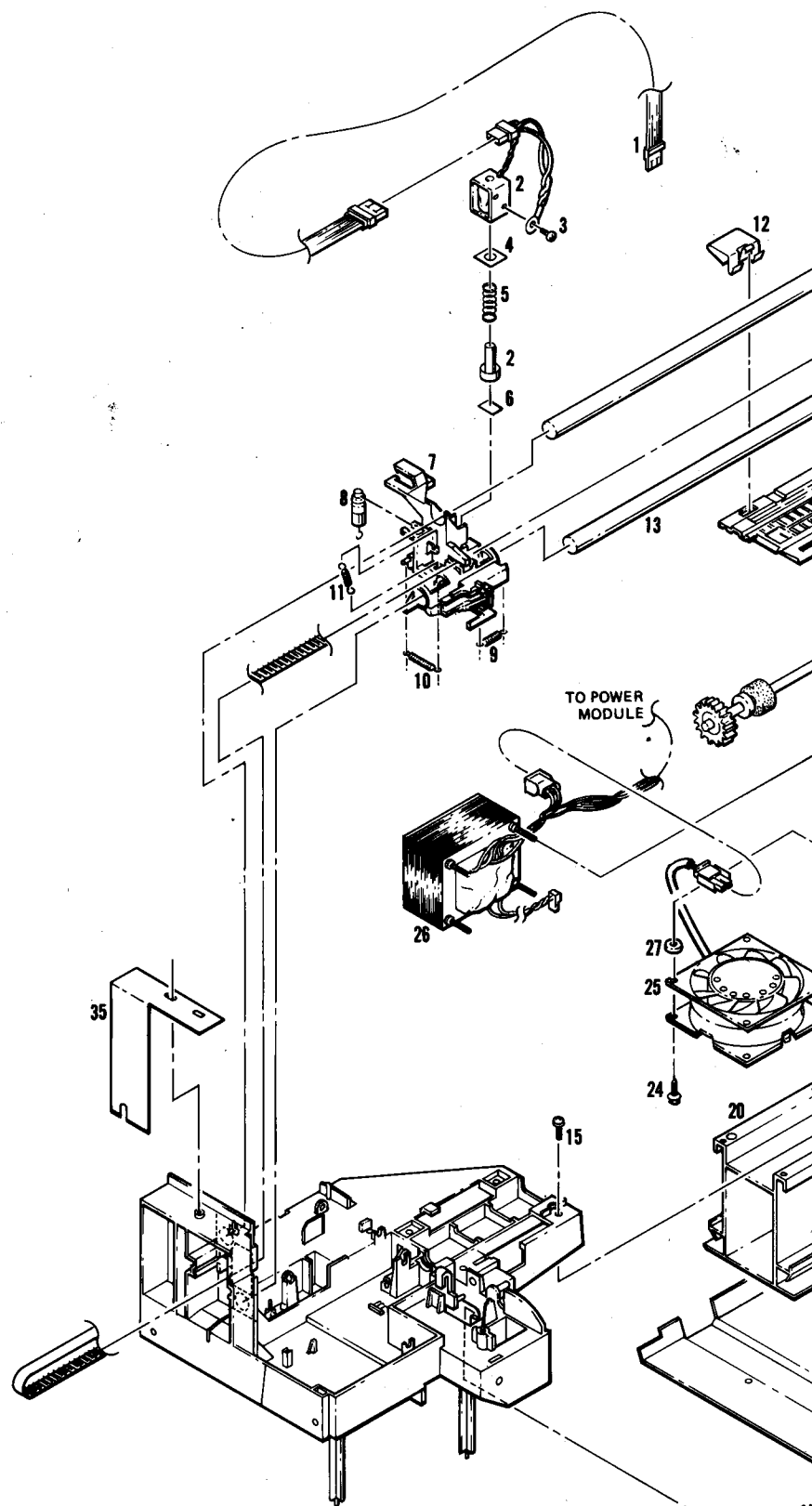
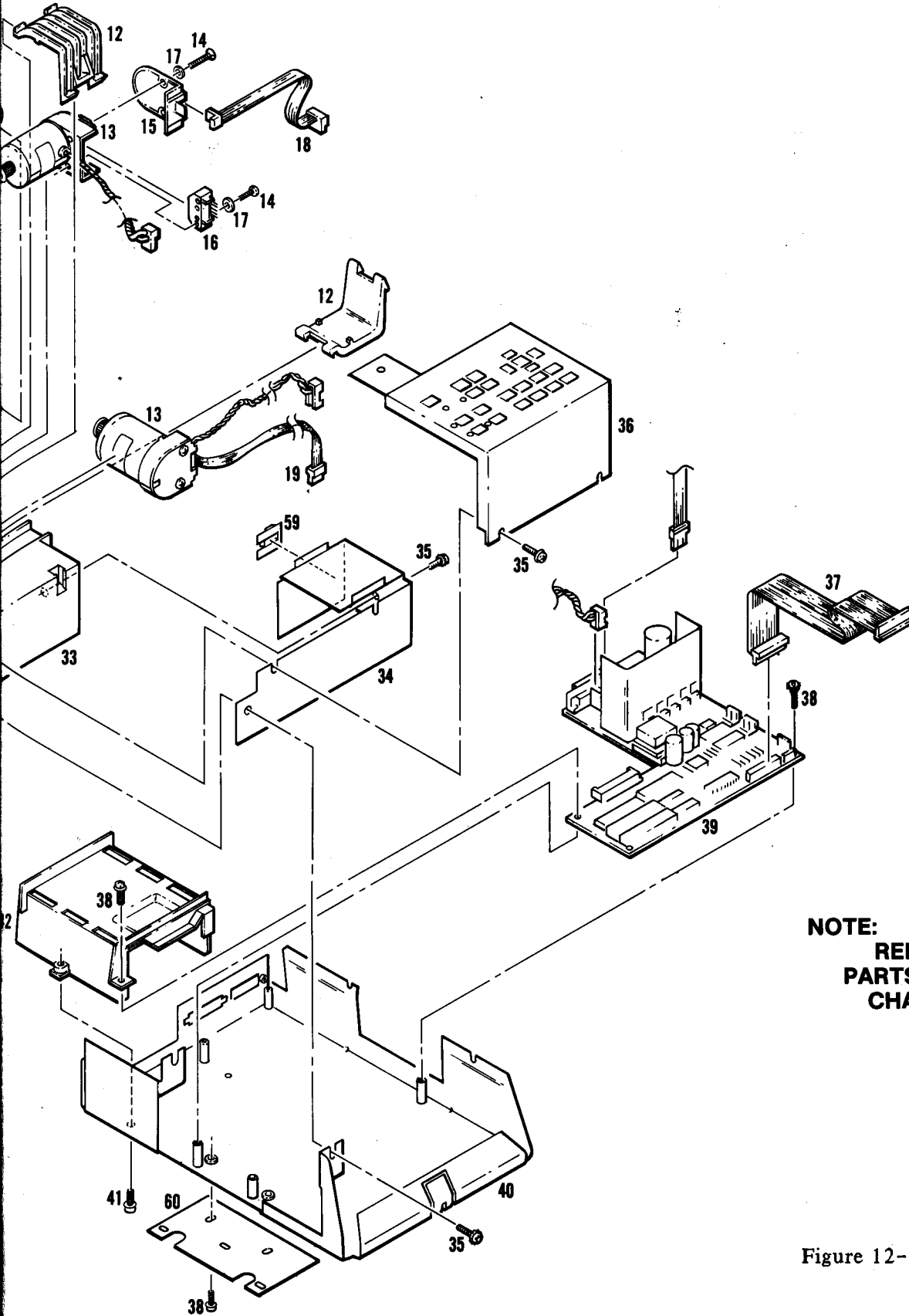


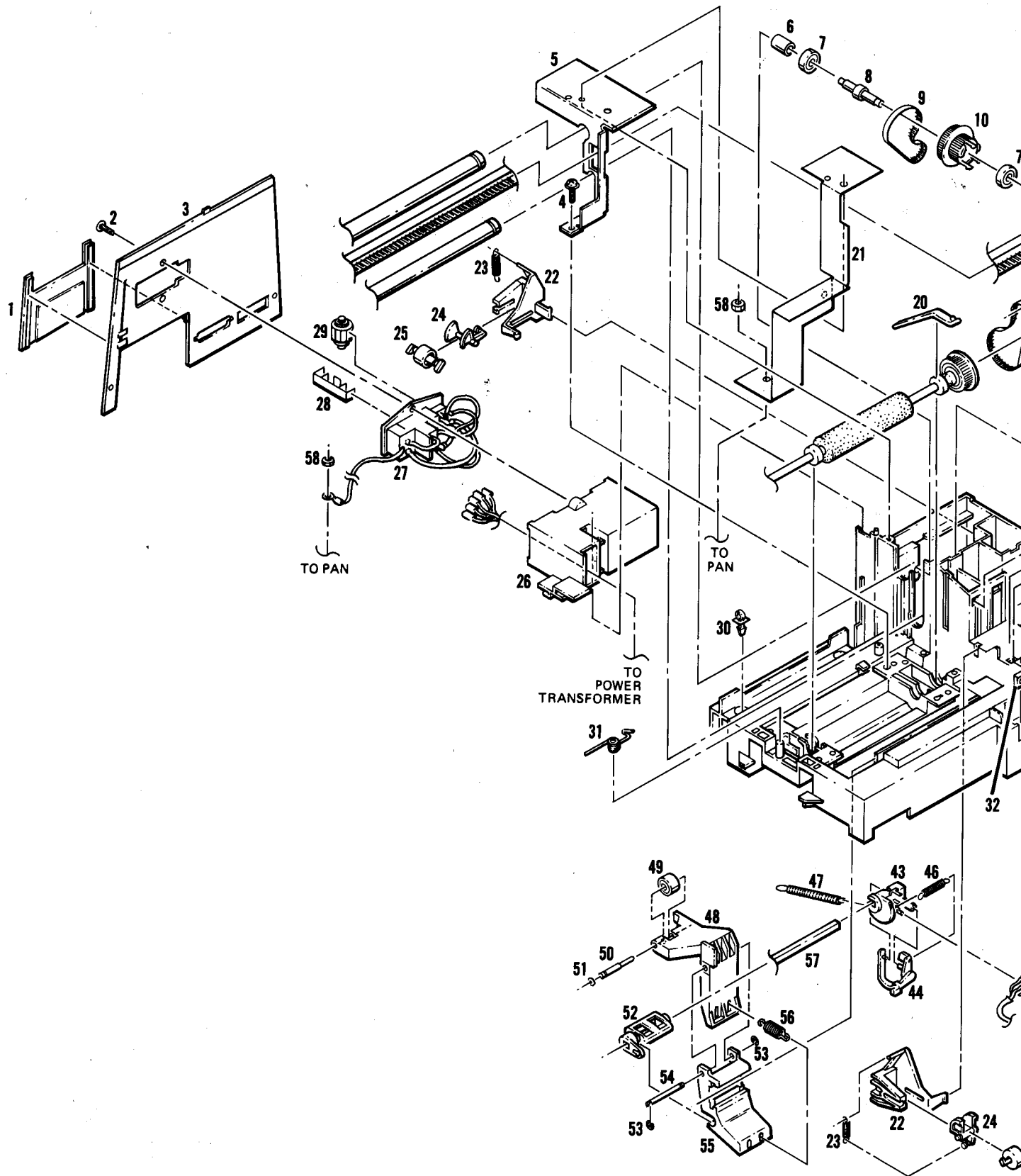
Figure 12-3. Center Chassis Assembly,
Illustrated Parts Breakout

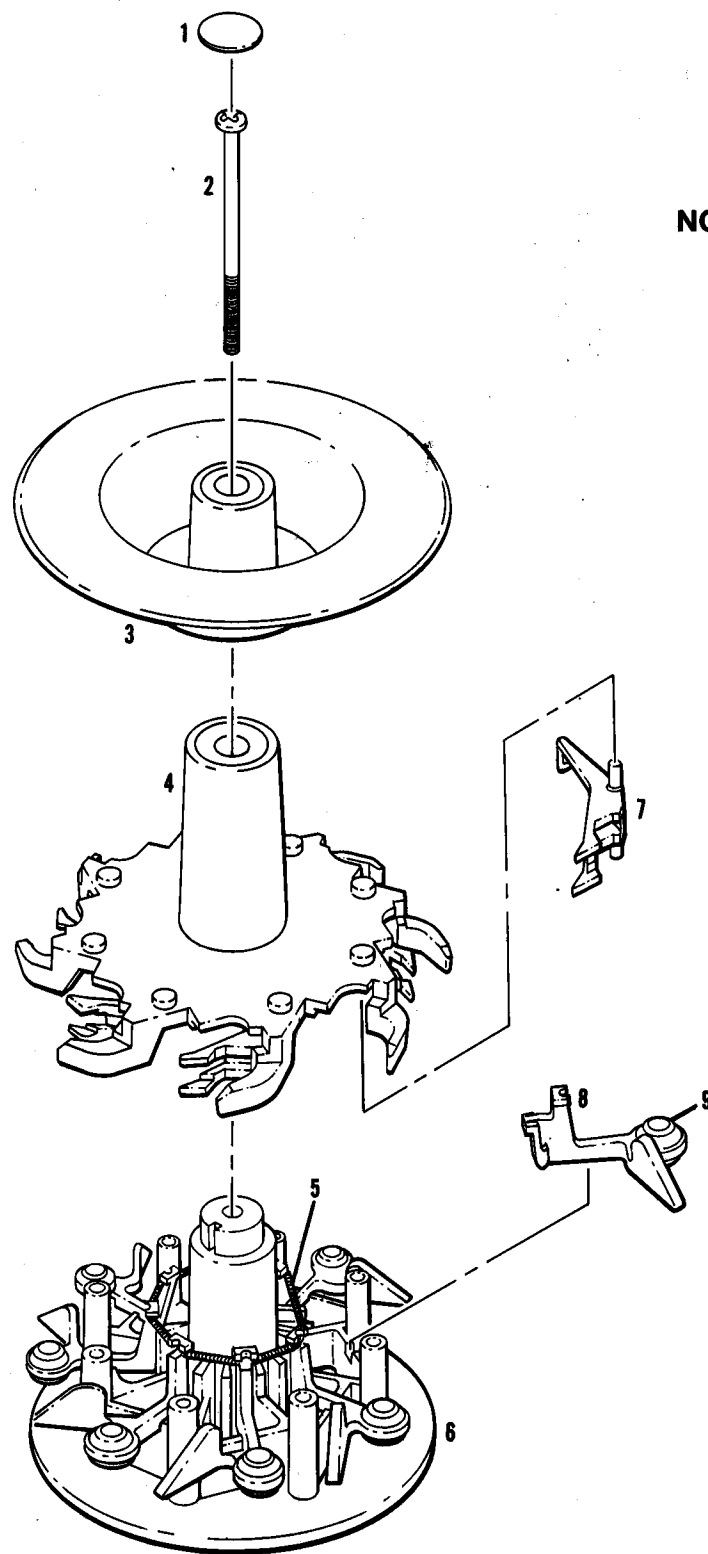




NOTE:
REFER TO
PARTS LISTS IN
CHAPTER 9

Figure 12-4. Right-Hand Chassis Assembly,
Illustrated Parts Breakout





NOTE:
REFER TO
PARTS LISTS IN
CHAPTER 9

Figure 12-5. Pen Carousel Assembly,
Illustrated Parts Breakout

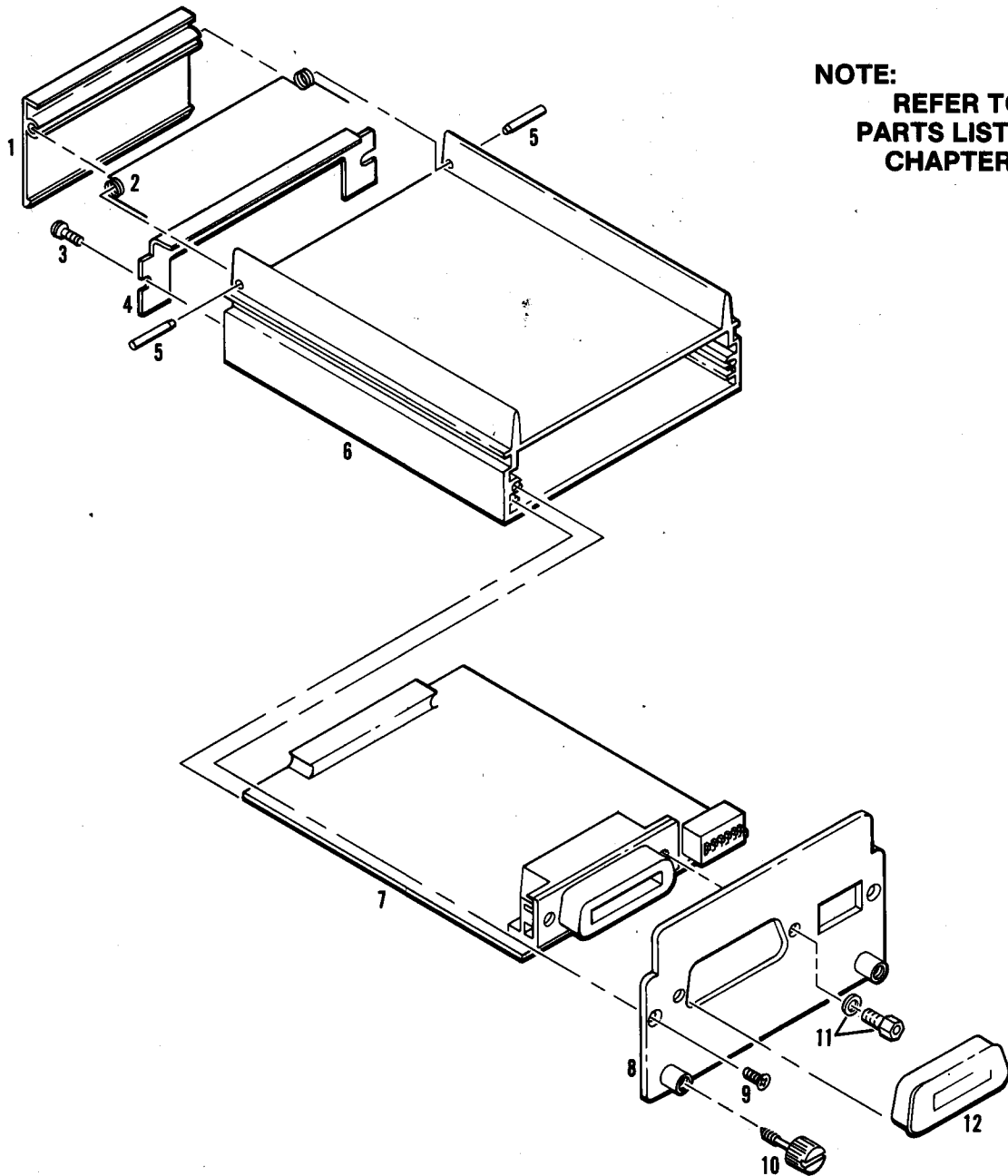


Figure 12-6. Optional I/O Module,
Illustrated Parts Breakout

Resistance in ohms, capacitance in microfarads, inductance in millihenries unless otherwise noted.



Denotes a factory selected value. Value shown is typical. Part might be omitted.



Indicates a NOTE on the schematic diagram.



Tool aided adjustment.



Manual control.



Encloses a front-panel or circuit assembly silkscreened designator.



Encloses a rear-panel silkscreened designator.



Circuit assembly borderline.



Other assembly borderline. Also used to indicate mechanical interconnection (ganging) and RF shielding.



Path and direction of main signal.



Path and direction of main feedback.



Cable run with seven lines.



Wiper moved toward "CW" with clockwise rotation of control (as viewed from shaft or control end).



Test point. Measurement aid (post, circuit pad, etc.) provided.



Test Point. No measurement aid provided.



Encloses wire color code. Code used is the same as the resistor color code. First number identifies the base color, second number identifies the wider stripe, third number identifies the narrower stripe. (e.g. (947) denotes white base, yellow wide stripe, violet narrow stripe).



A direct conducting connection to the earth, or a conducting connection to a structure that has a similar function (e.g. the frame of an air, sea, or land vehicle).



OR



A conducting connection to a chassis or frame.

Figure 12-7. Schematic Diagram Notes

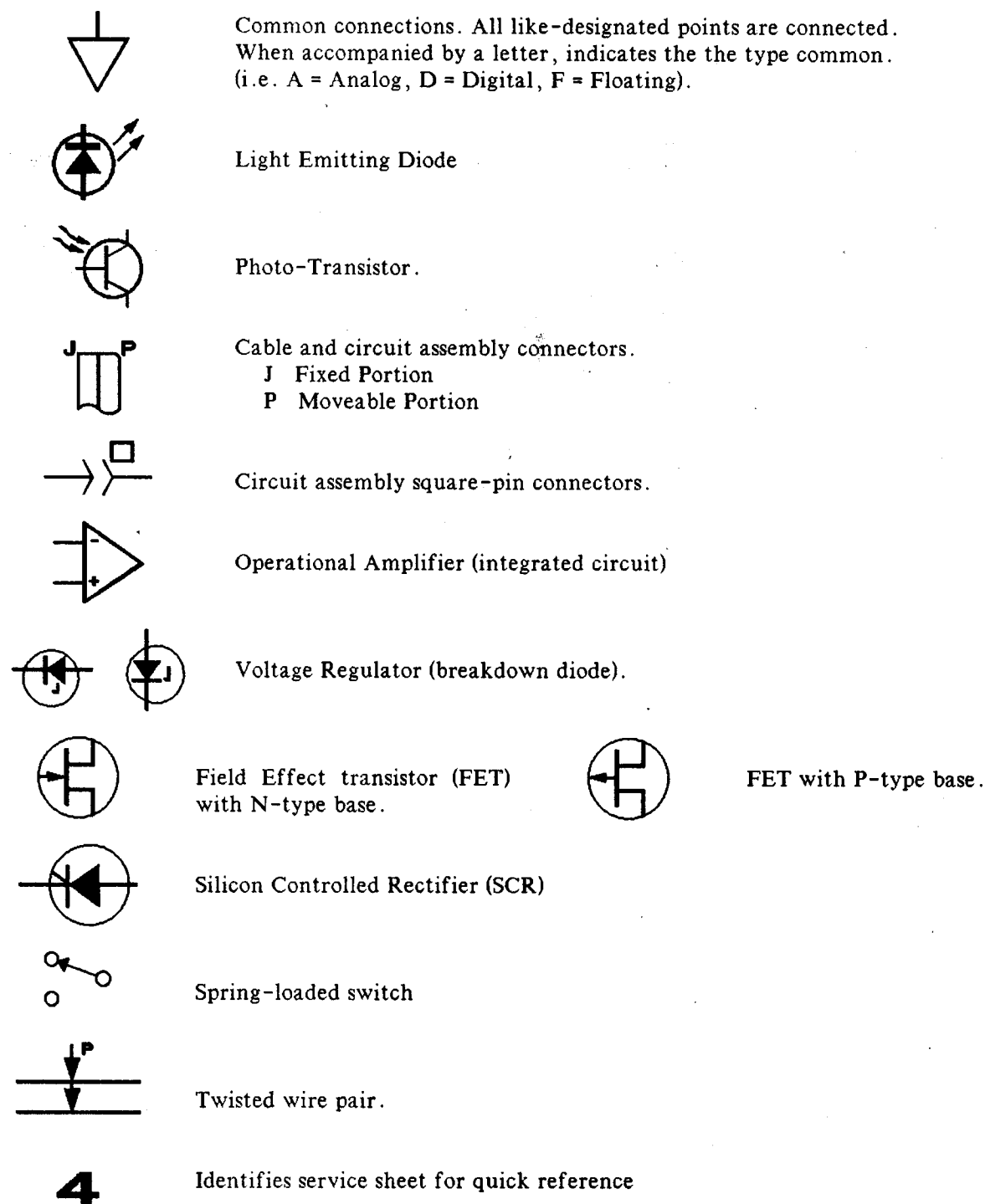


Figure 12-7. Schematic Diagram Notes (Cont.)

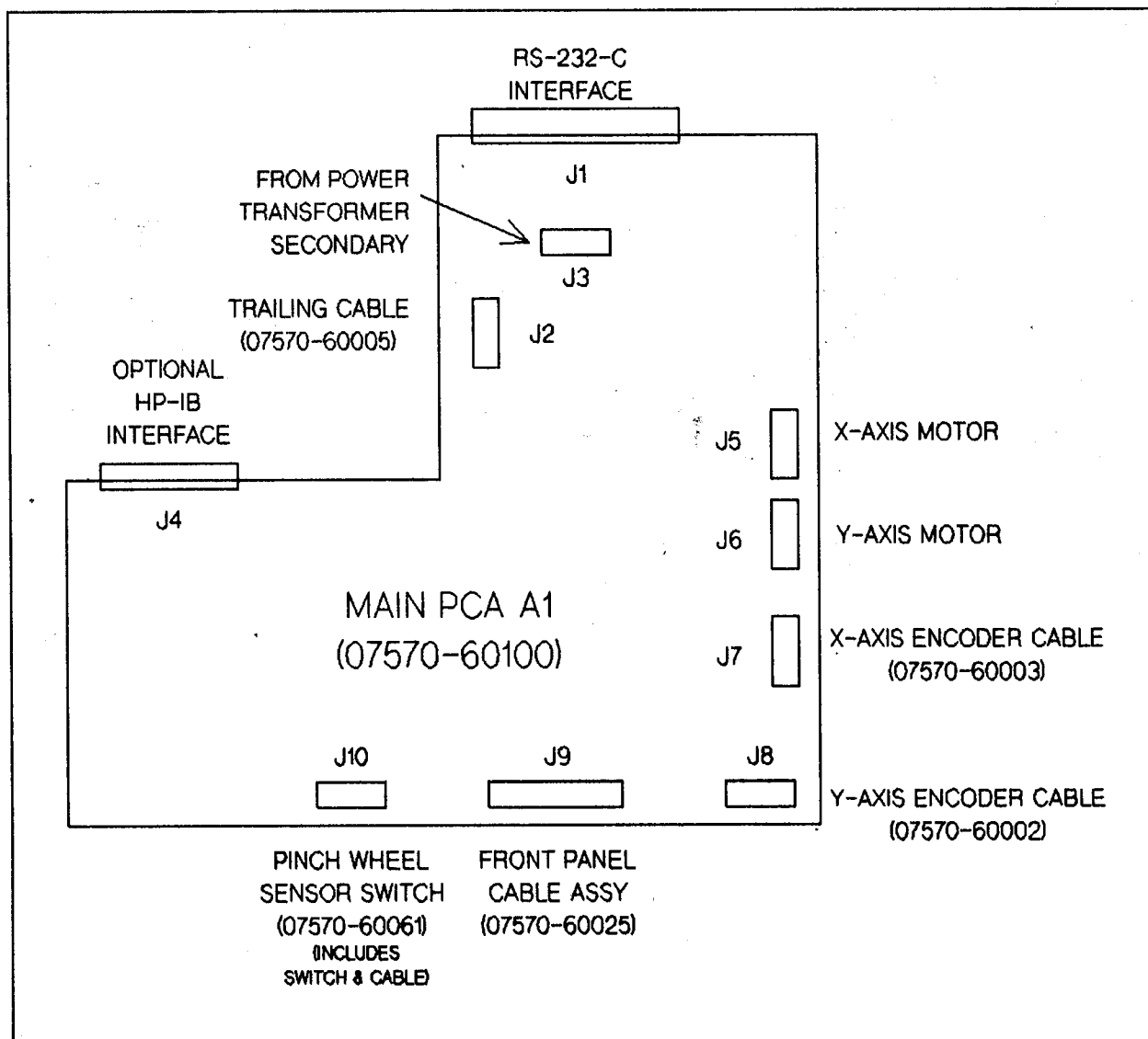


Figure 12-8. Cable and Connector Diagram

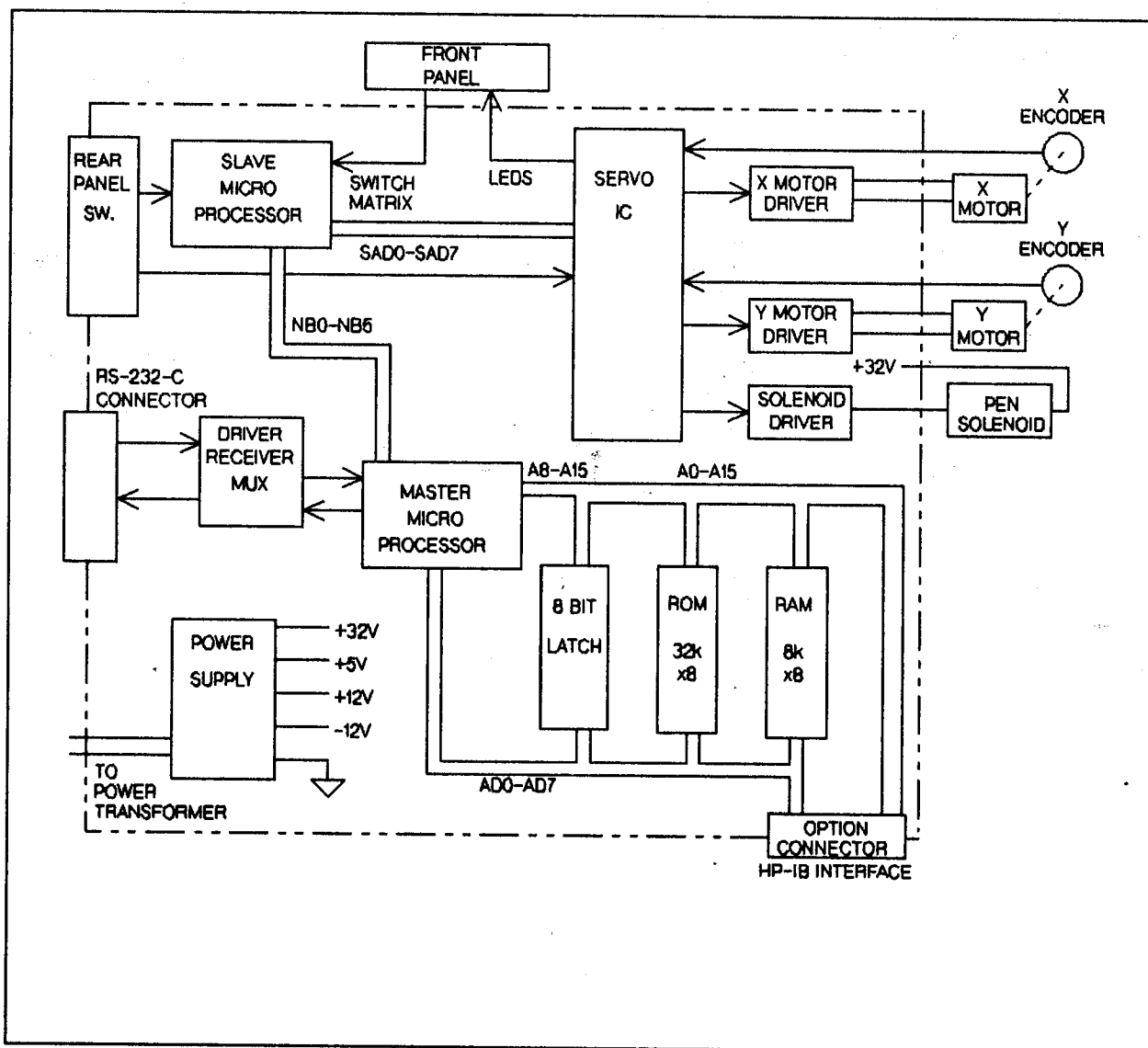


Figure 12-9. Simplified Block Diagram

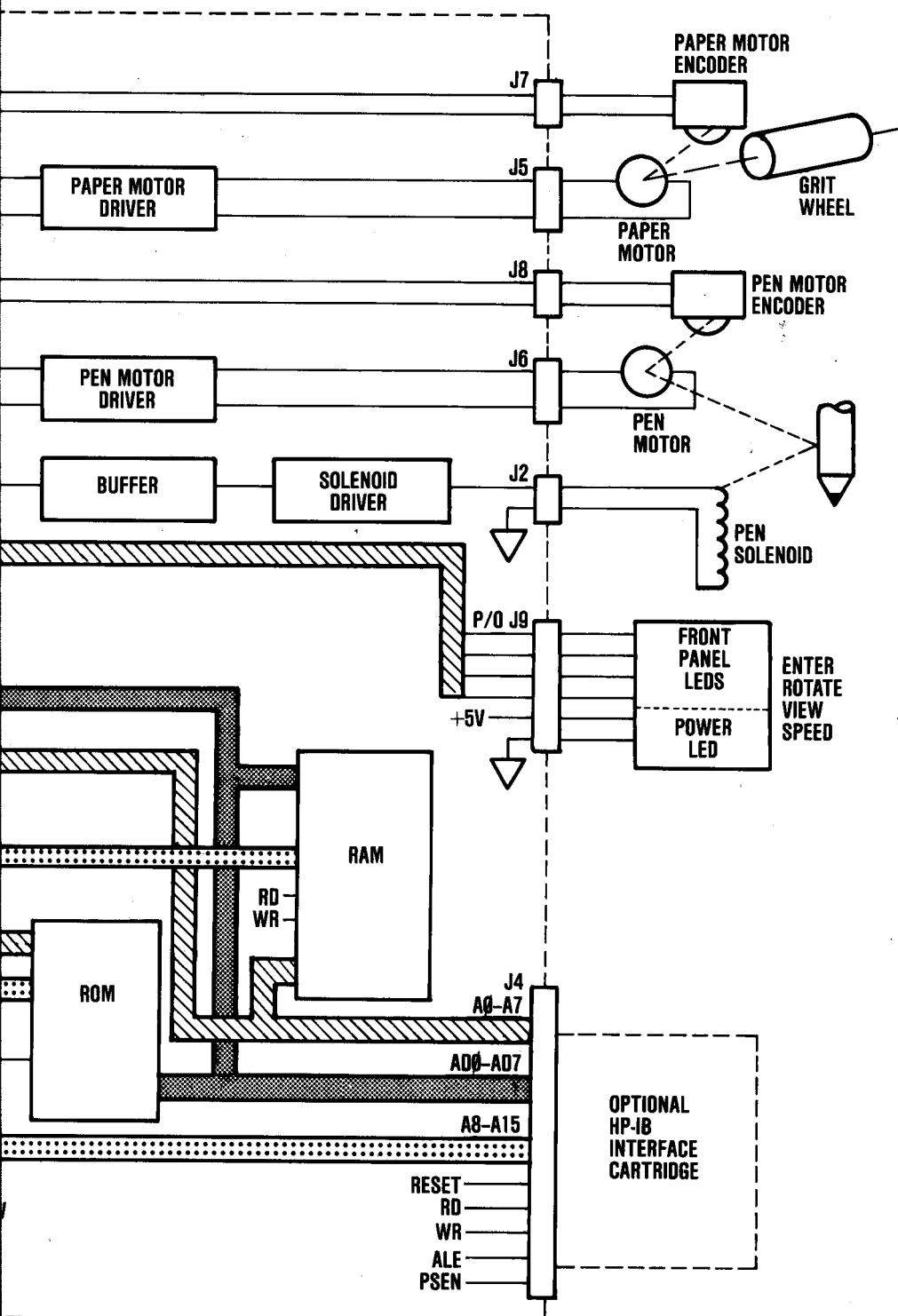
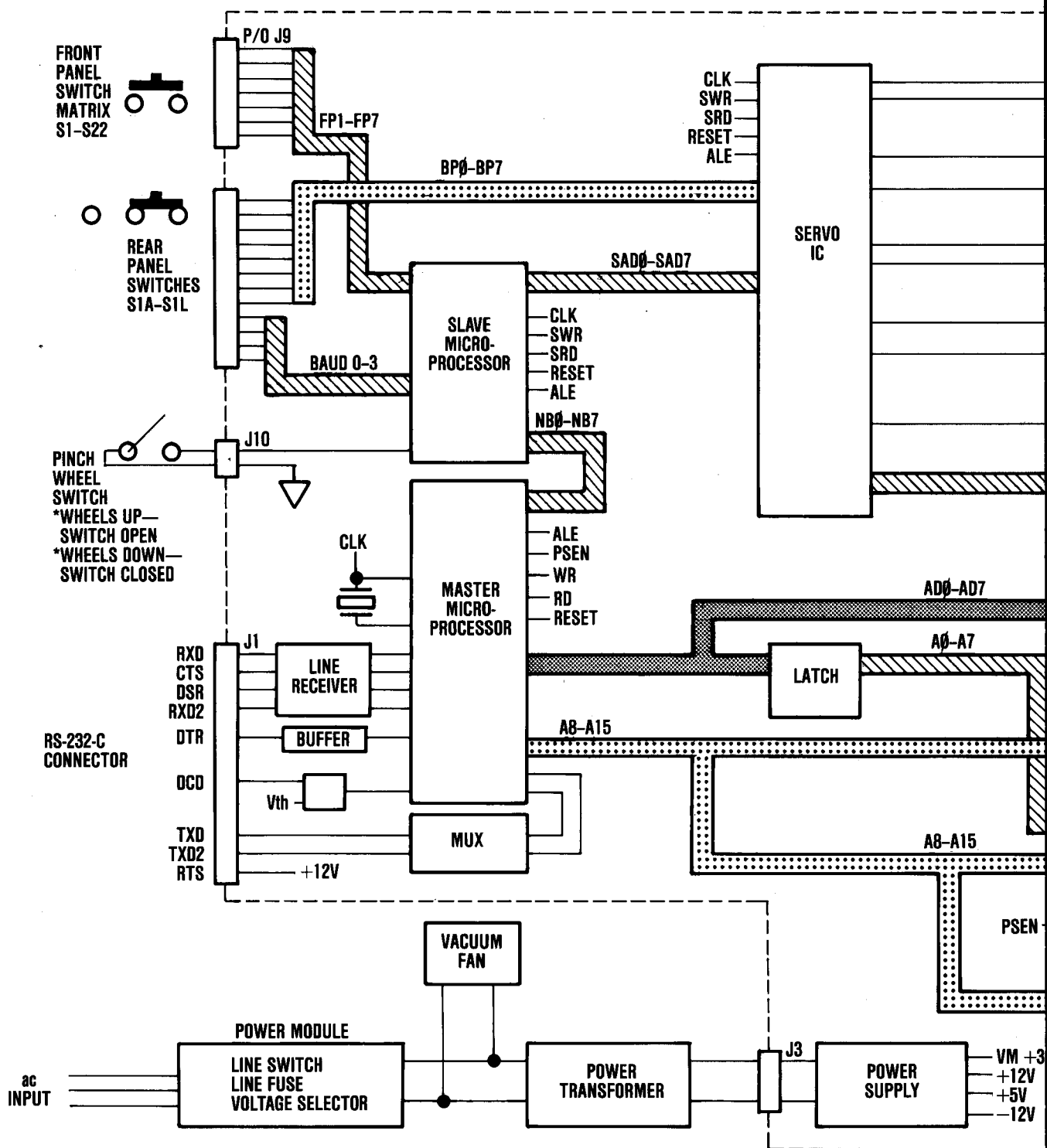
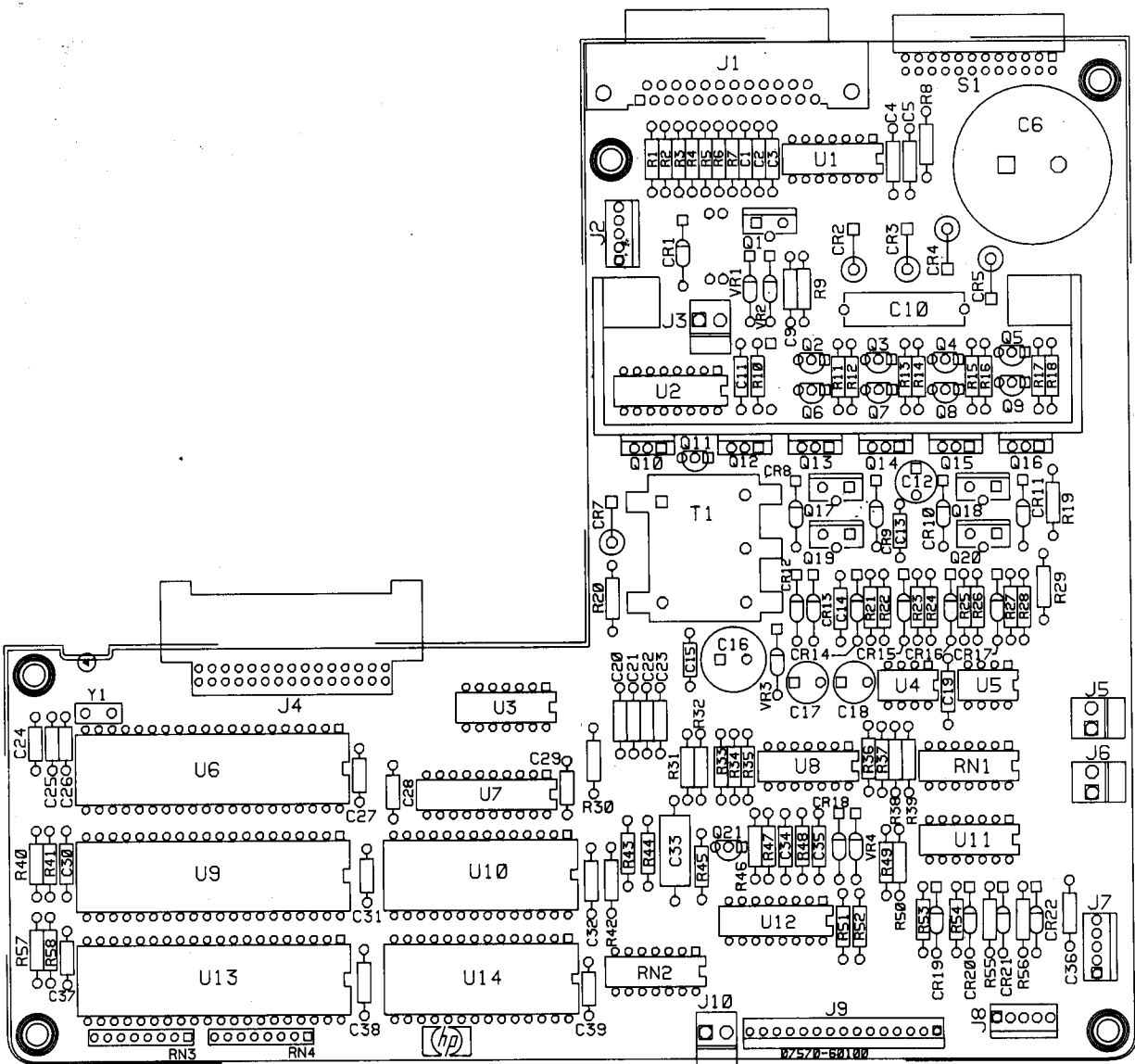


Figure 12-10. Functional Block Diagram

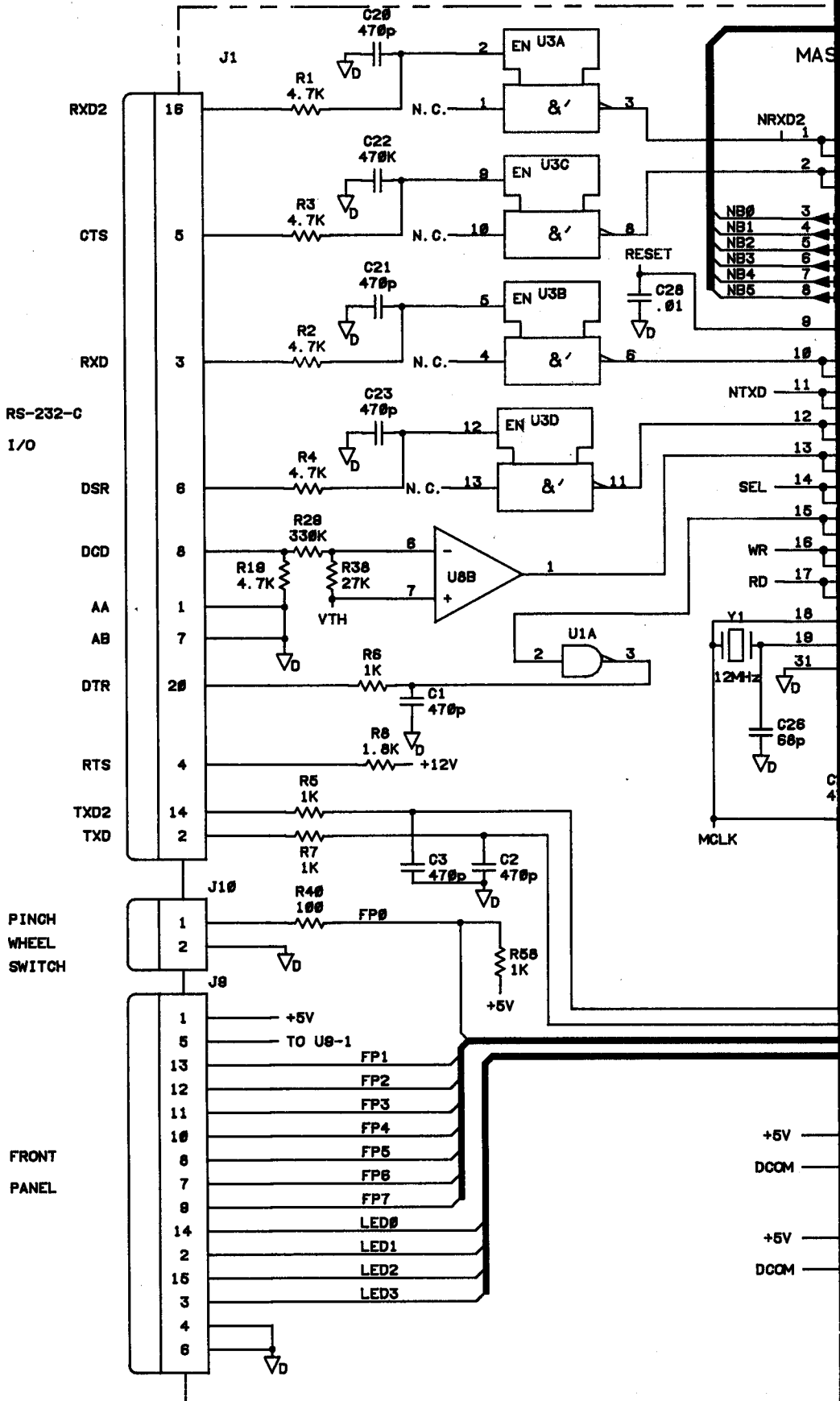




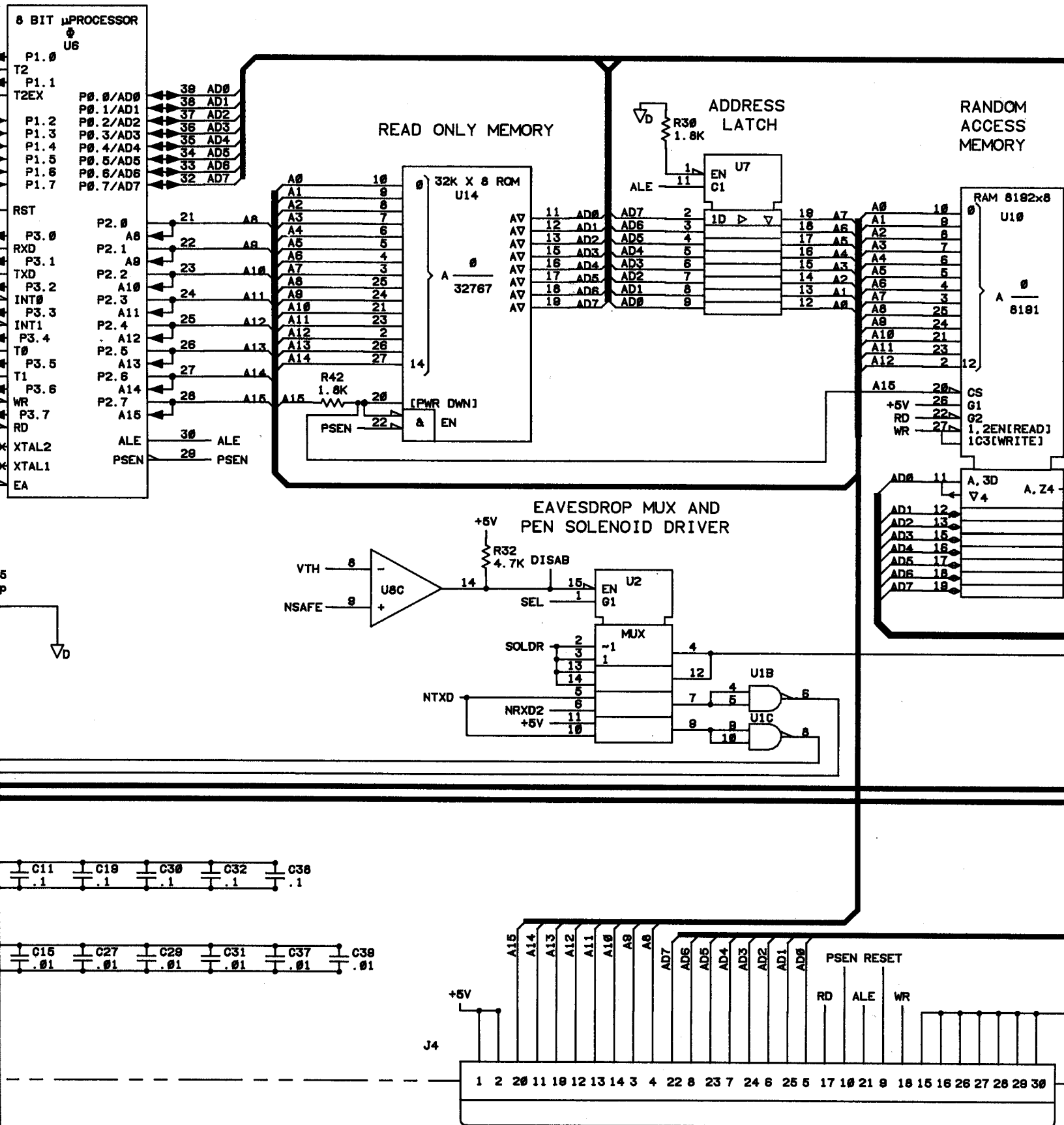
7570-B-50-1

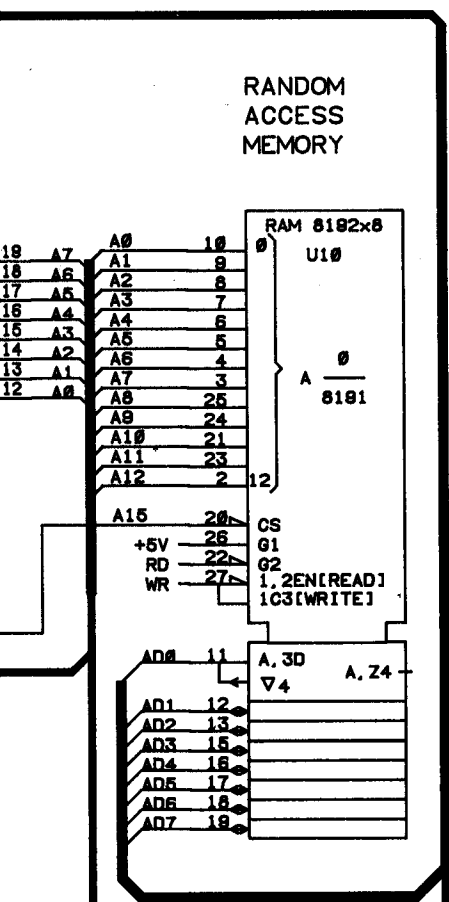
Figure 12-11 Main PCA A1 Component Location

PART OF A1 MAIN PCA (07570-00100)

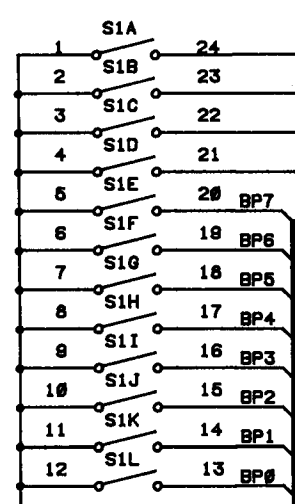


TER MICROPROCESSOR



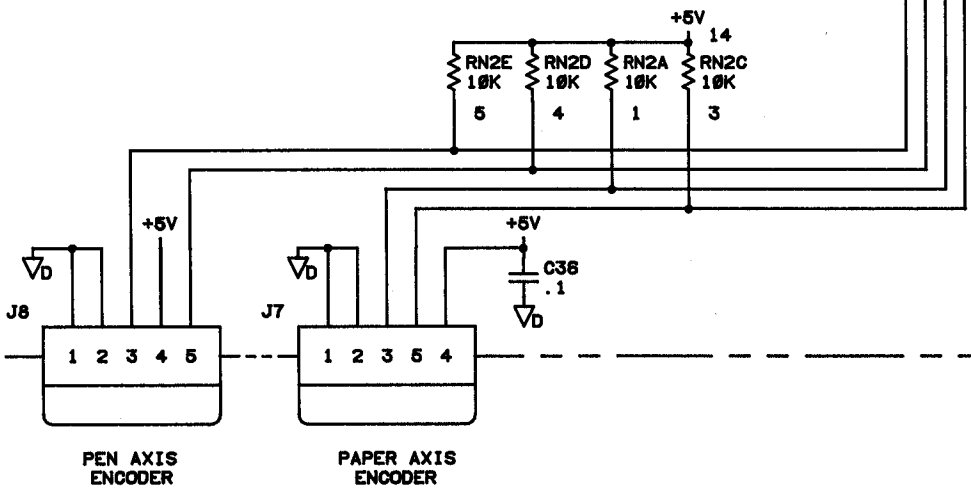
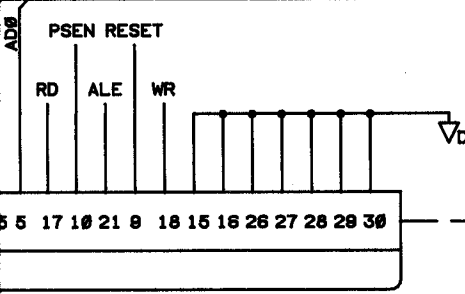
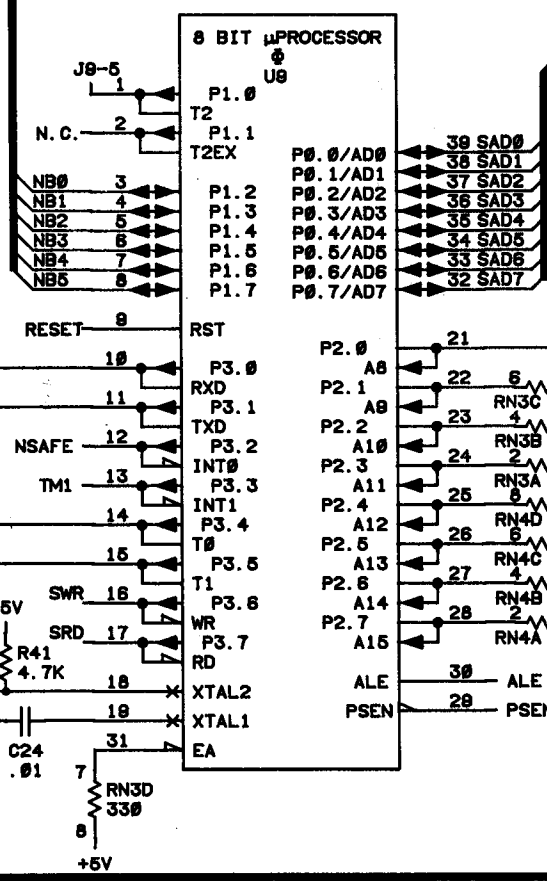


REAR PANEL SWITCH

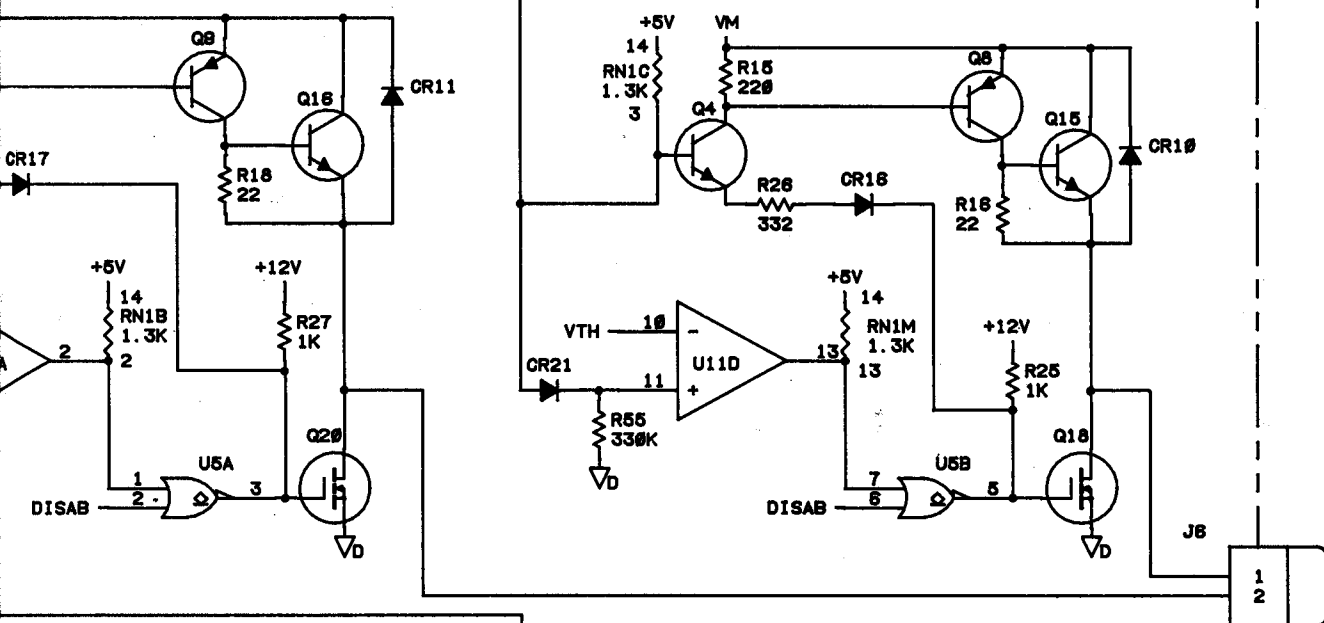


FOR SWITCH FUNCTIONS
SEE NOTE 1

SLAVE MICROPROCESSOR



IVE CIRCUITS

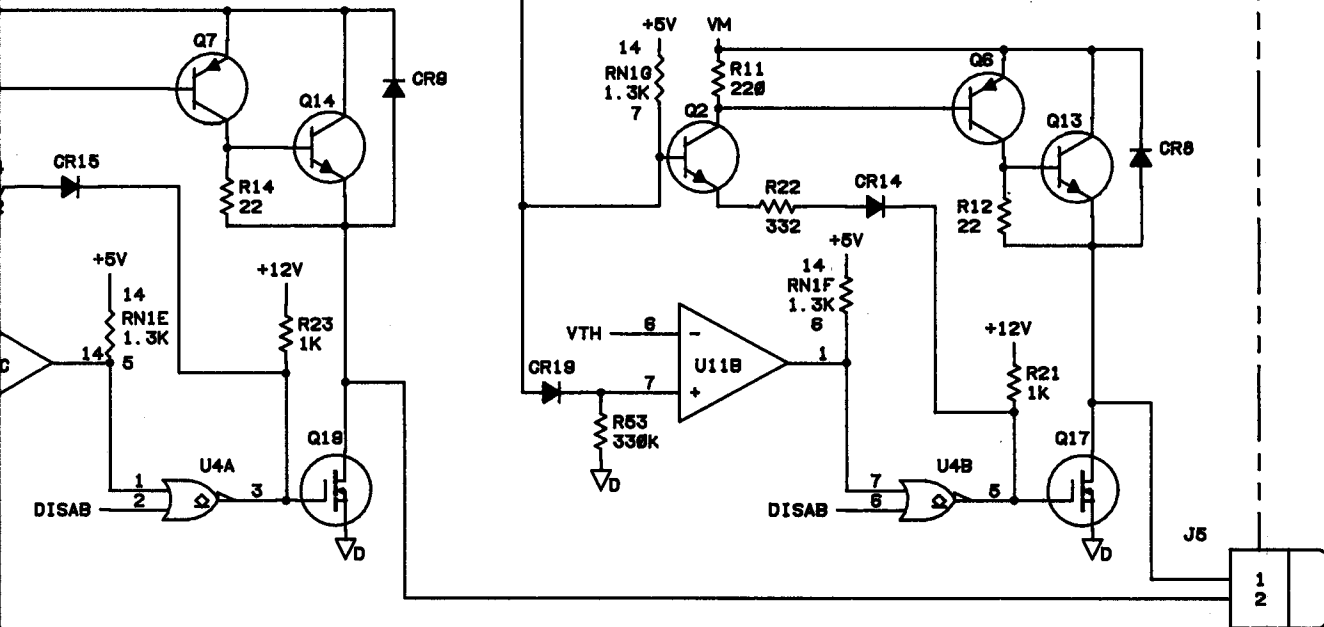


NOTE 1

REAR F
SWITCH

S1A
S1B
S1C
S1D
S1E
S1F
S1G
S1H
S1I
S1J
S1K
S1L

PEN-AXIS
DRIVE

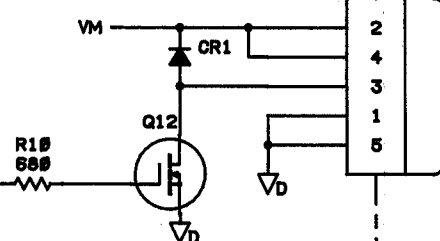


POWER

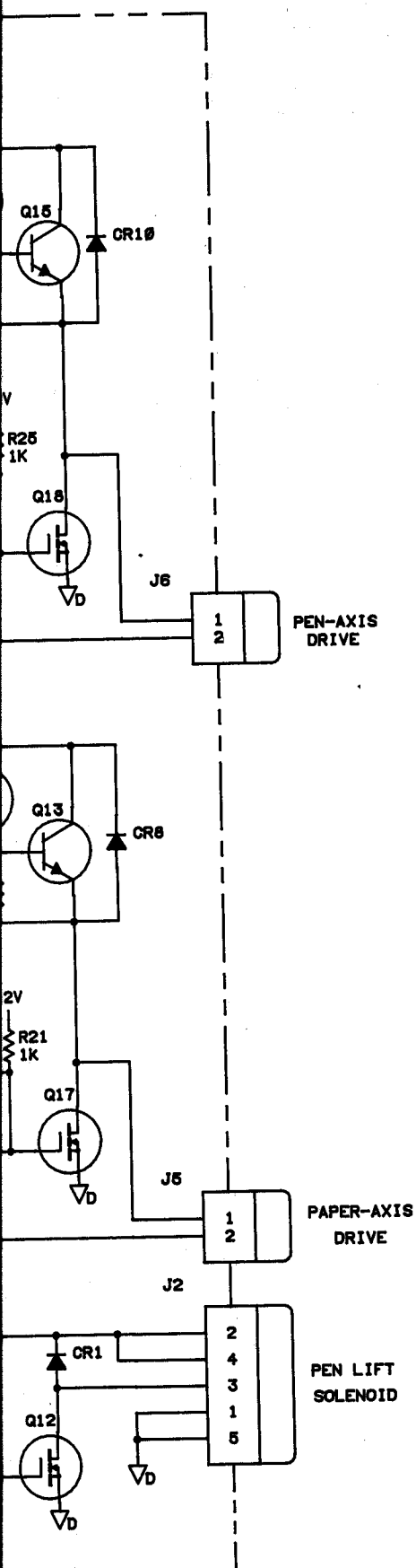
REF. D

U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
U12
U13
U14

PAPER-AXIS
DRIVE



PEN LIFT
SOLENOID



NOTE 1:

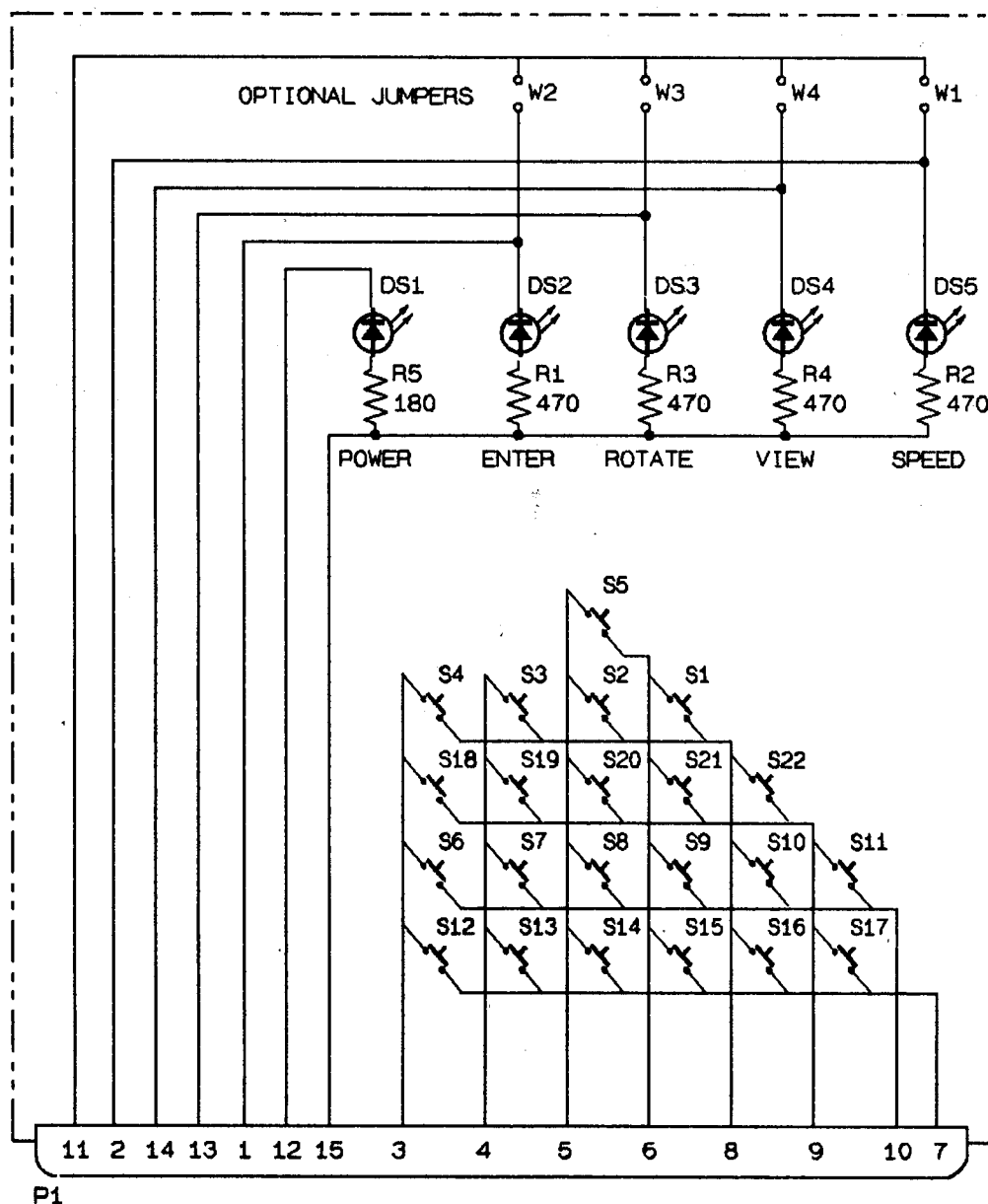
REAR PANEL SWITCH S1

SWITCH	FUNCTION
S1A	TEST
S1B	RESERVED
S1C	RESERVED
S1D	EXPAND
S1E	PEN SORT
S1F	EAVESDROP
S1G	ODD
S1H	PARITY
S1I	BAUD 3
S1J	BAUD 2
S1K	BAUD 1
S1L	BAUD 0

POWER AND COMMON CONNECTIONS:

REF. DES.	COMMON	POWER	BYPASS CAPS
U1	7(DCOM)	1(-12V), 14(+12V)	NA
U2	8(DCOM)	18(+5V)	C11
U3	7(DCOM)	14(+5V)	NA
U4	4(DCOM)	8(+5V)	C19
U5	4(DCOM)	8(+5V)	NA
U6	20(DCOM)	40(+5V)	C27
U7	10(DCOM)	20(+5V)	C29
U8	12(DCOM)	3(+5V)	NA
U9	20(DCOM)	40(+5V)	C30, C31
U10	14(DCOM)	28(+5V)	C32
U11	12(DCOM)	3(+12V)	NA
U12	7(DCOM)	12(+5V)	NA
U13	1(DCOM), 20(DCOM)	21(+5V), 40(+5V)	C37, C38
U14	14(DCOM)	1(+5V), 28(+5V)	C39

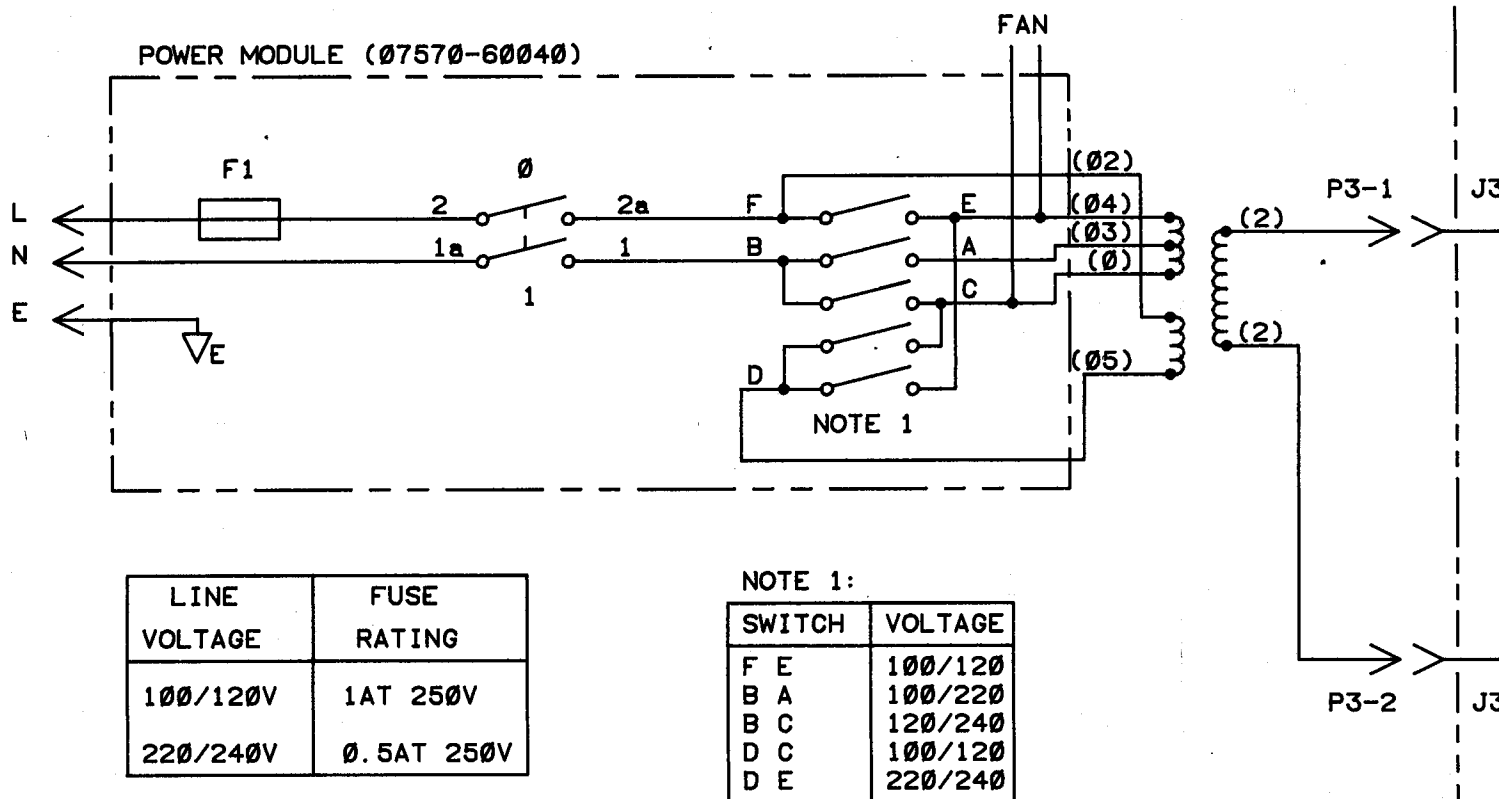
Figure 12-12. Main PCA A1
Schematic Diagram



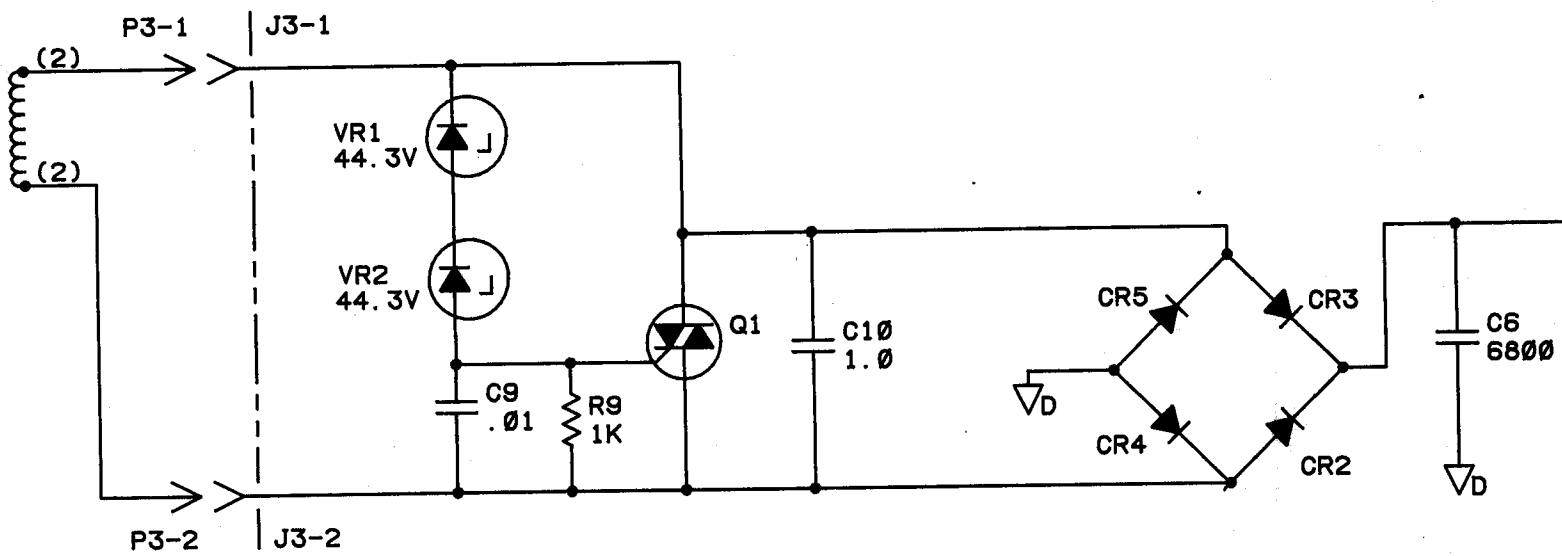
Switch Reference

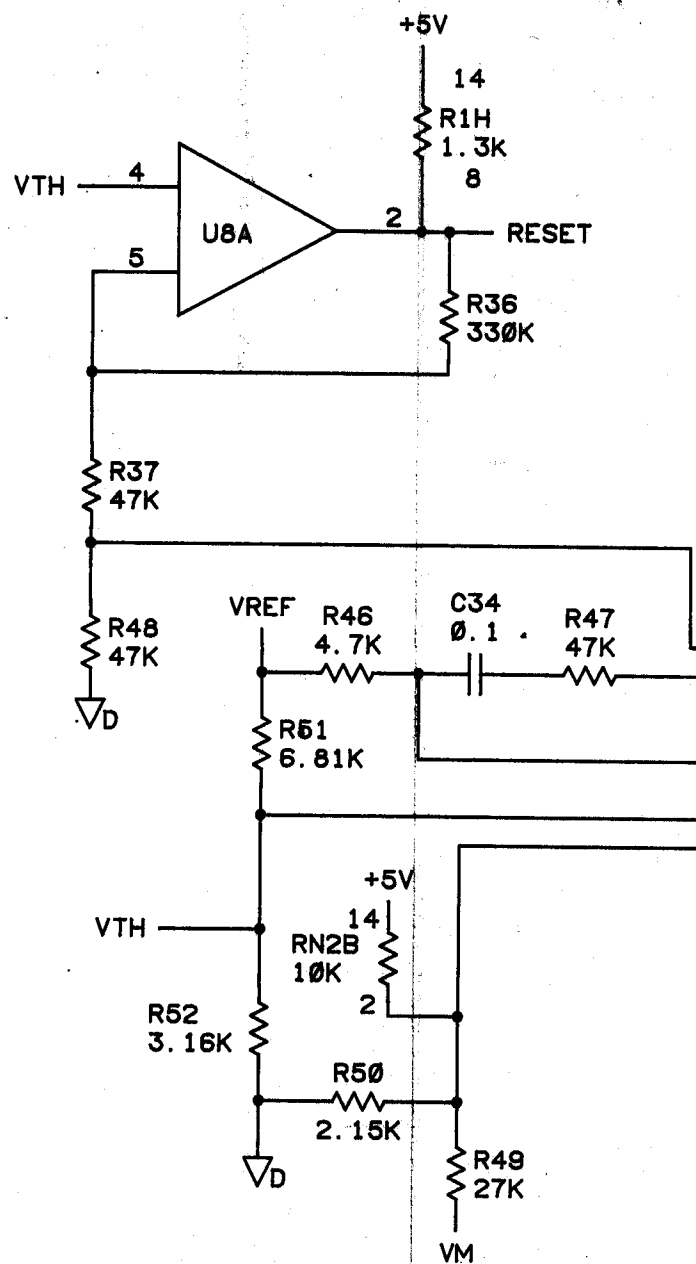
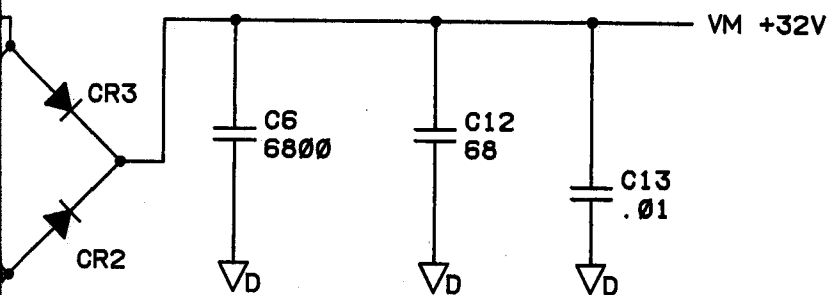
Switch	Panel Button	Switch	Panel Button	Switch	Panel Button
S1	Clear	S8	Pen 1	S15	Pen 6
S2	P2	S9	Pen 2	S16	Pen 7
S3	Axis Align	S10	Pen 3	S17	Pen 8
S4	Enter	S11	Pen 4	S18	Up
S5	P1	S12	View	S19	Left
S6	Rotate	S13	Speed	S20	Fast
S7	Pen Up/Down	S14	Pen 5	S21	Right
				S22	Down

Figure 12-15. Front Panel PCA Schematic Diagram

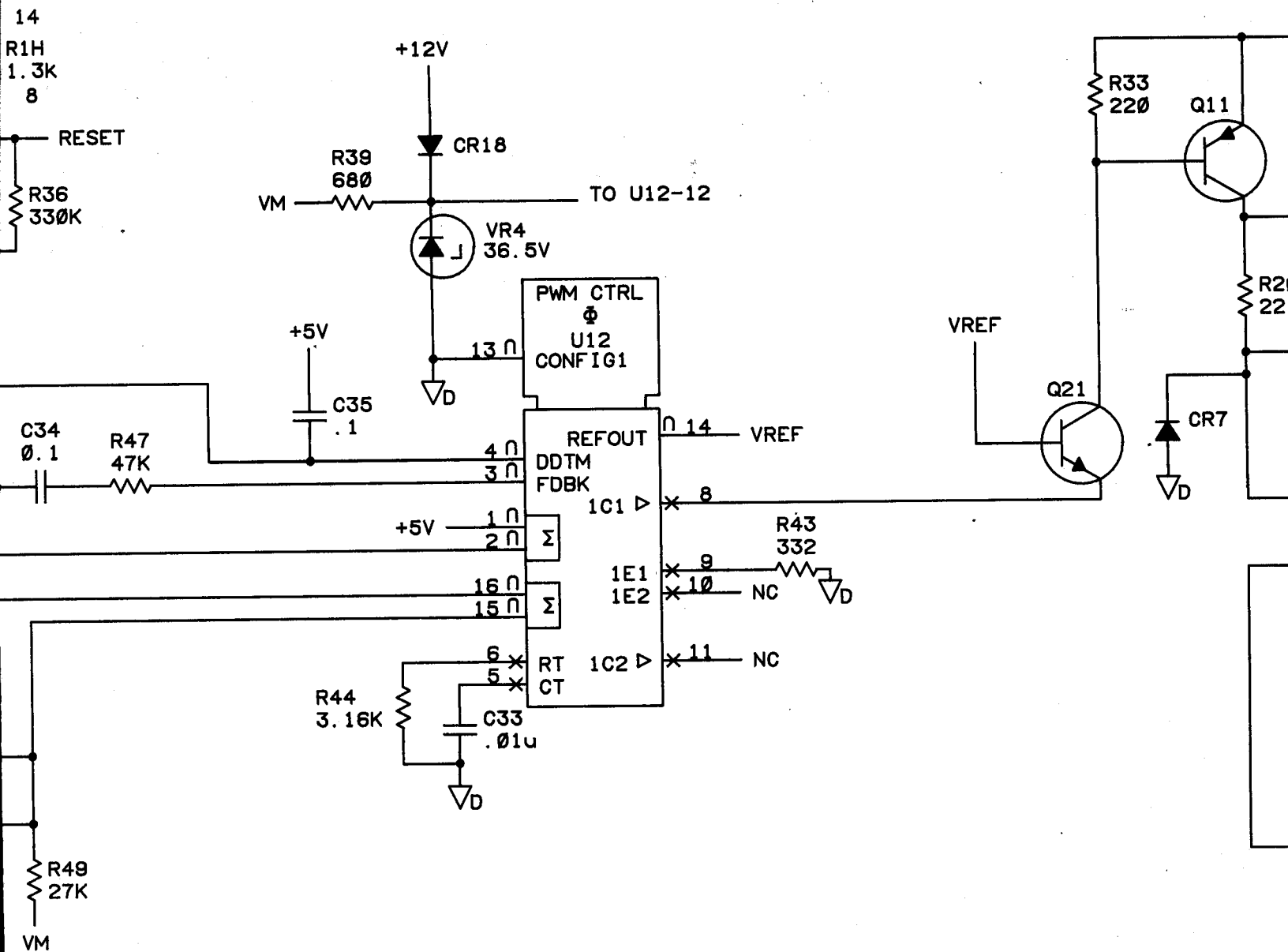


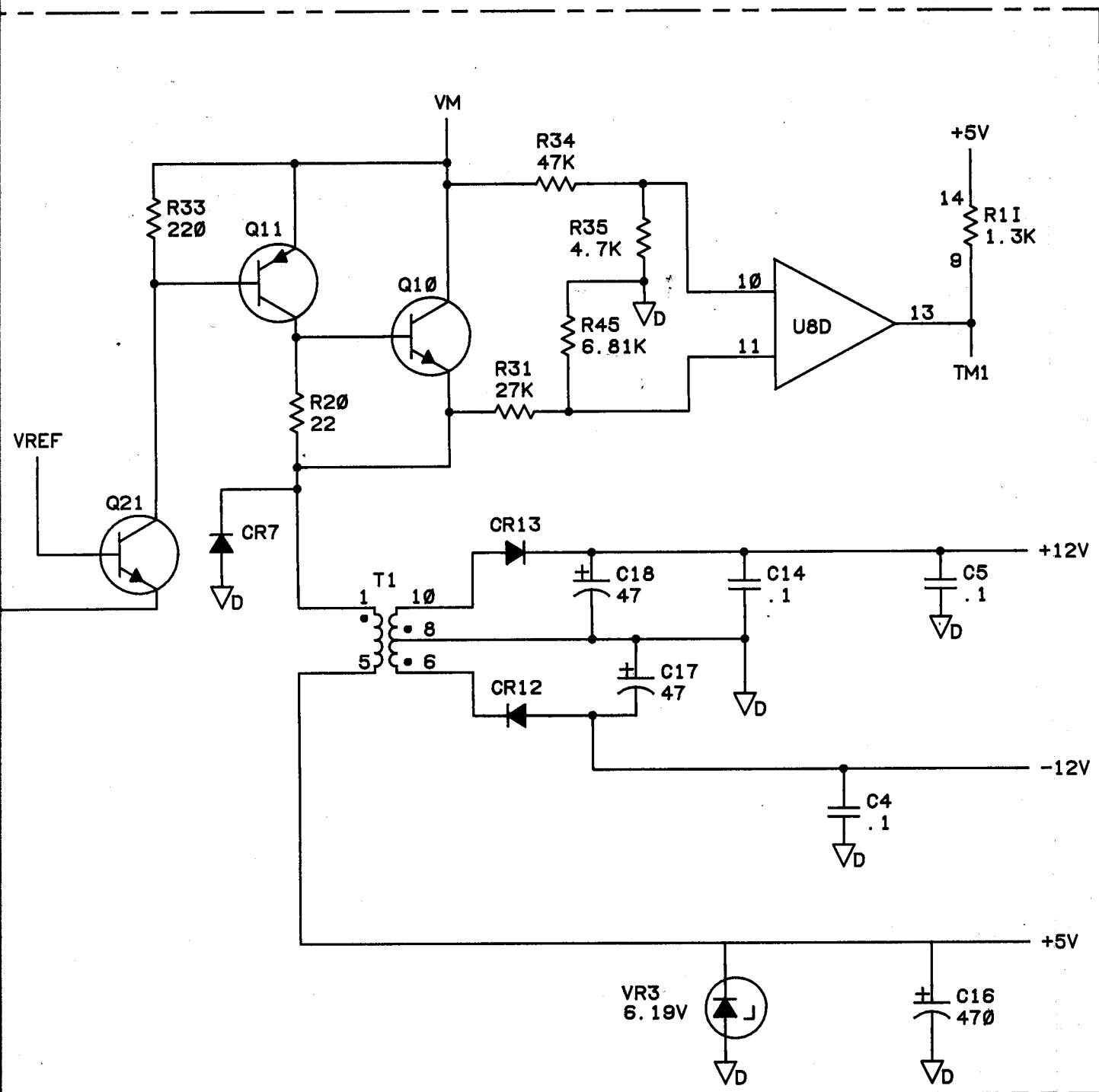
PART OF A1 MAIN PCA (07570-60100)





PWM CONTROLLER





POWER
REF.
U1
U8

POWER AND COMMON CONNECTIONS:

REF. DES.	COMMON	POWER	BYPASS CAPS
U12	7(DCOM)	12(+32V)	NA
U8	12(DCOM)	3(+5V)	NA

Figure 12-14. Main PCA A1
Power Supply Schematic Diagram

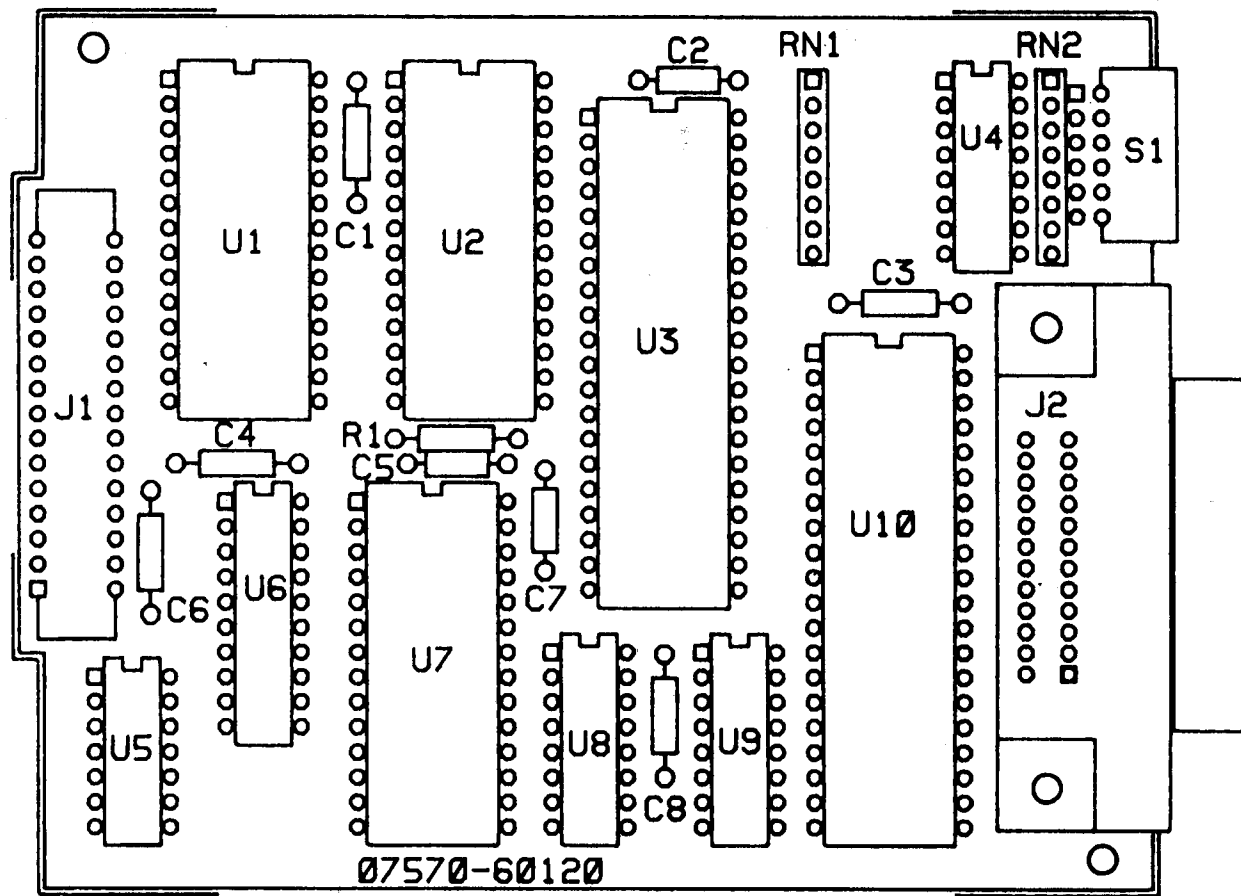
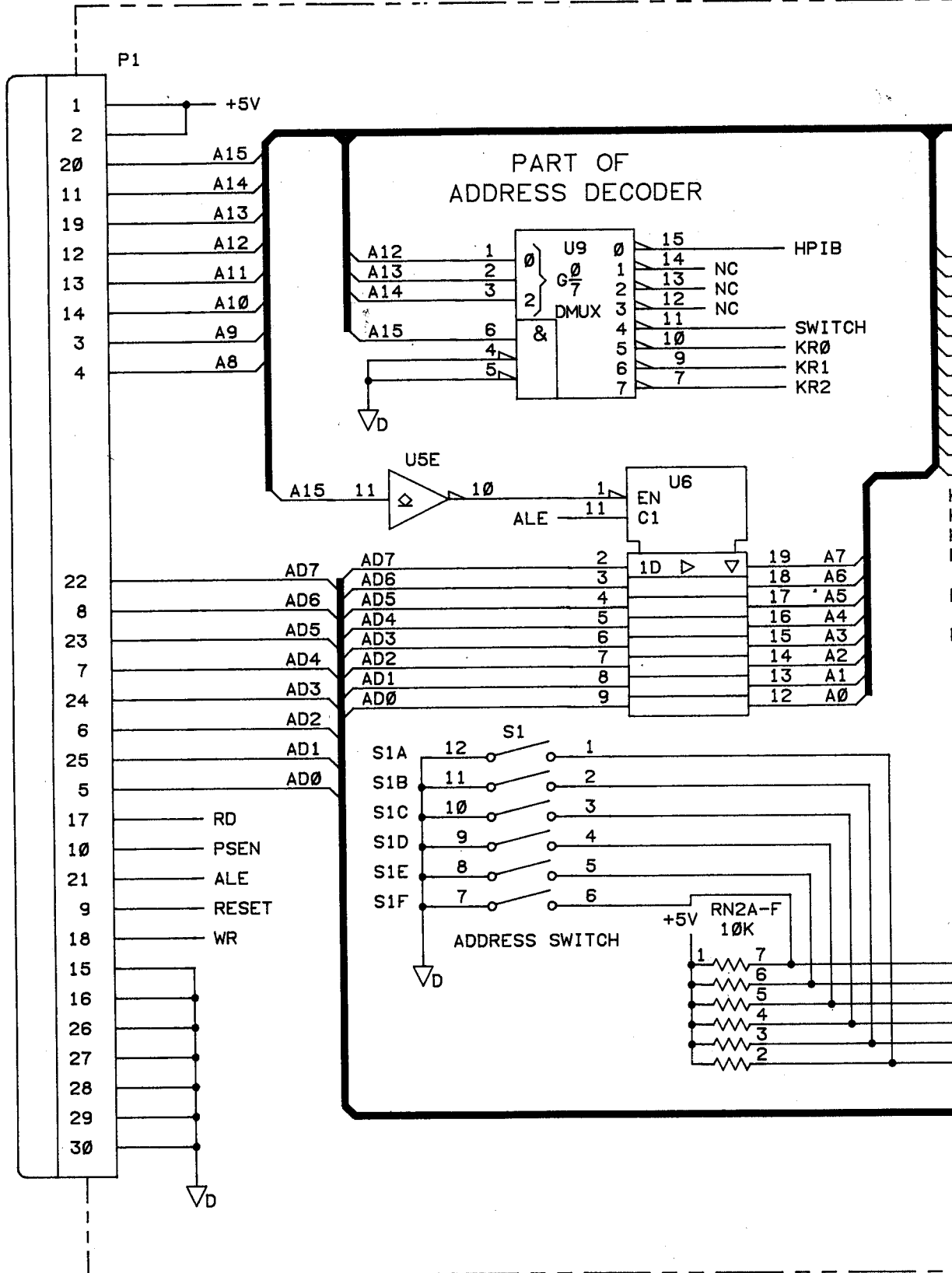


Figure 12-16. Optional I/O Module Component Location

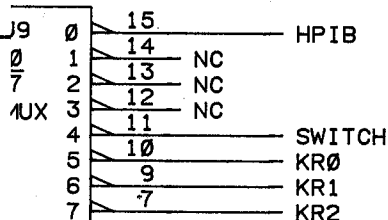
OPTIONAL PCA (07570-60140)

PLOTTER
INTERFACE
CONNECTOR

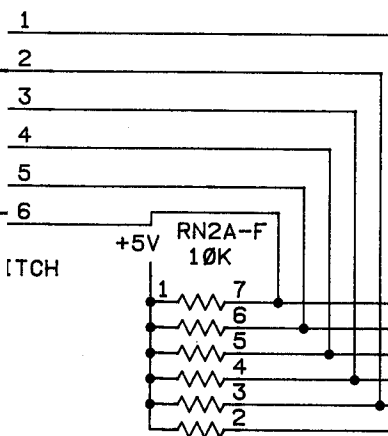
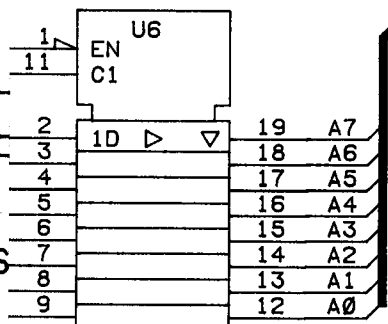


READ ONLY MEMOR

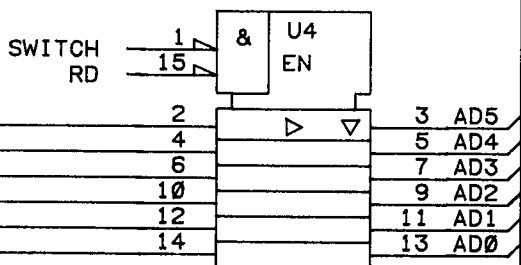
OF DECODER



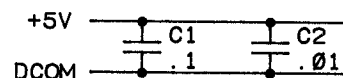
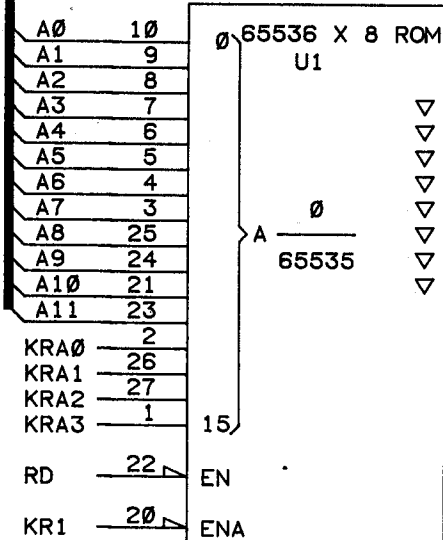
NOTE 1



BUS DRIVER

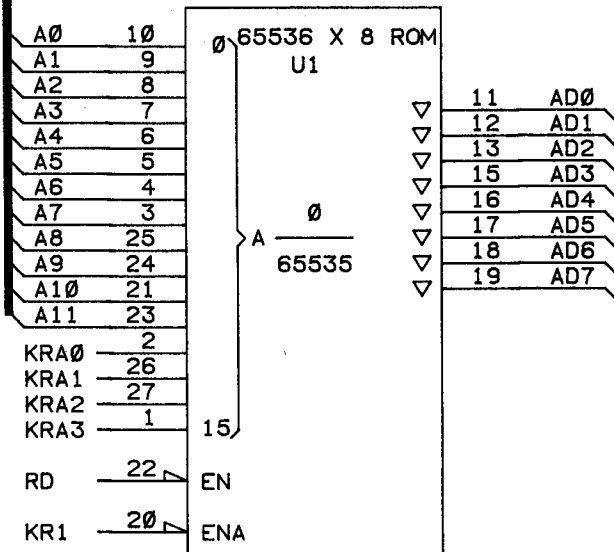


NOTE 1

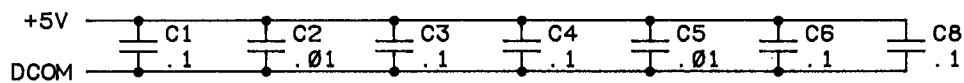
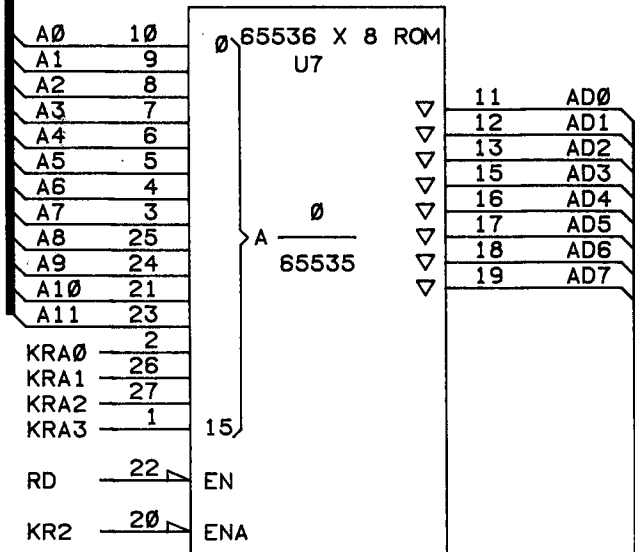


READ ONLY MEMORY

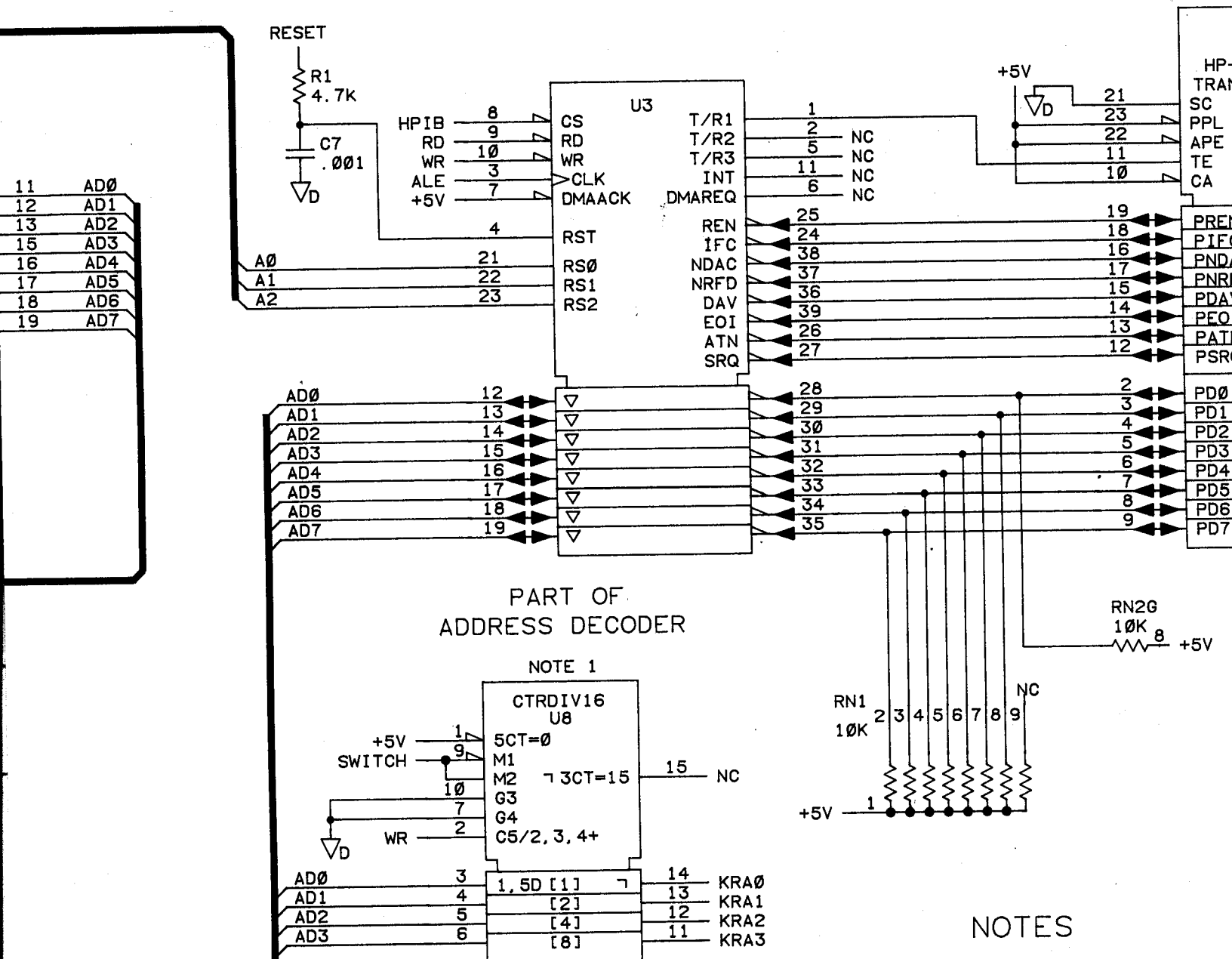
NOTE 1



NOTE 1

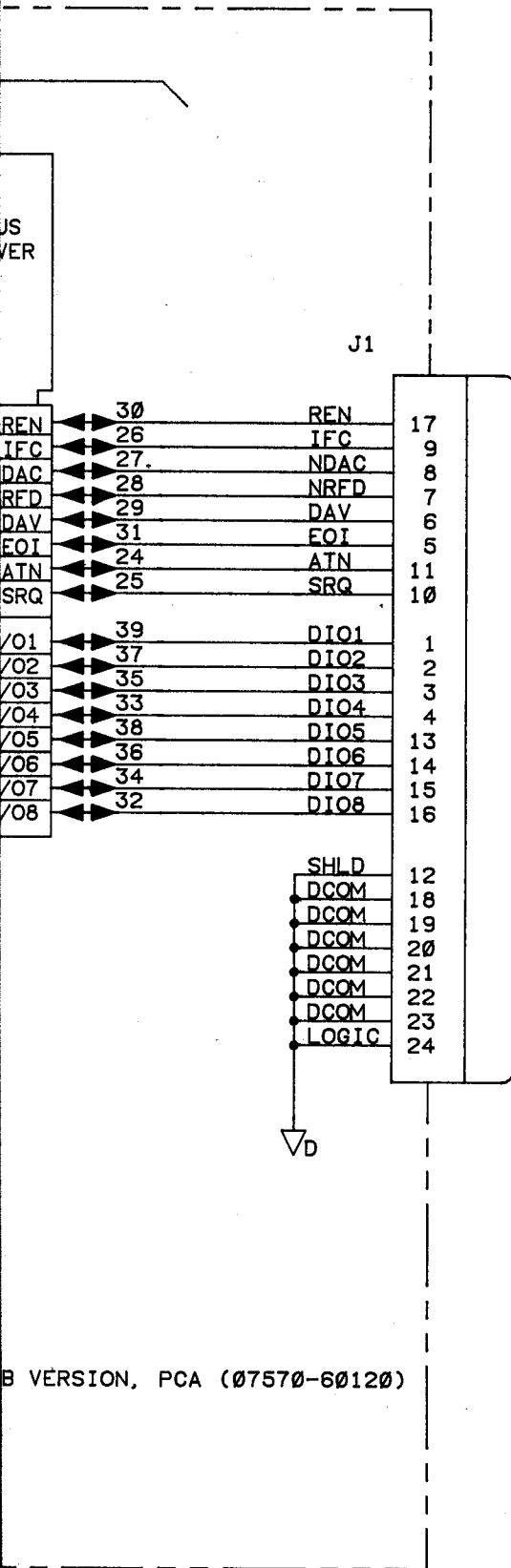


HP-IB INTERFACE



NOTES

1. THIS IC NOT LOADED 1



CONTROLLER
INPUT/OUTPUT

POWER AND COMMON CONNECTIONS:

REF. DES.	COMMON	POWER	BYPASS CAPS
U1	14 (DCOM)	28 (+5V)	C1
U2	14 (DCOM)	28 (+5V)	C1
U3	20 (DCOM)	40 (+5V)	C2
U4	8 (DCOM)	16 (+5V)	NA
U5	7 (DCOM)	14 (+5V)	C6
U6	10 (DCOM)	20 (+5V)	C4
U7	14 (DCOM)	28 (+5V)	C5
U8	8 (DCOM)	16 (+5V)	NA
U9	8 (DCOM)	16 (+5V)	C8
U10	1 (DCOM), 20 (DCOM)	40 (+5V)	C3

Figure 12-17. Optional I/O
Module Schematic Diagram